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BIBLIOGRAPHY ON  
METHODS OF SAMPLING AIRBORNE PARTICLES

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METHODS OF SAMPLING AIRBORNE PARTICLES.

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References marked with an asterisk (\*) are those which are available for loan in the Camp Detrick Technical Library. This bibliography is being kept up to date by a file of current references which is available in the library.




This bibliography contains journal references covering the years from about 1930 to June, 1953, and a few earlier references.

Main sources of the references were Bulletin of Hygiene, Chemical Abstracts, Industrial Arts Index, and the bibliographies in many of the articles themselves. The subject matter covers only methods of sampling airborne particles; no attempt was made to include subjects such as air cleaning or particle size analysis. Reference is made to abstracts in Chemical Abstracts and the Bulletin of Hygiene in many cases where the original paper is not in the Camp Detrick Technical Library.

The references ~~have been~~<sup>are</sup> divided into ten subject groupings and one title ~~has been~~<sup>is</sup> repeated under as many groups as seemed appropriate. Since many of the titles are not in the Camp Detrick Technical Library, classification of those titles under the subject groups was based only on the title of the paper; in some cases where no clue at all was available as to the type of sampler discussed in the paper, it was placed at the end in the miscellaneous group.

It is not claimed that this is a complete bibliography for the years covered, but it is hoped that no serious omissions have occurred.



BIBLIOGRAPHY ON  
METHODS OF SAMPLING AIRBORNE PARTICLES.

I. CONDENSATION.

- \* Aitken, John.  
On improvements on the apparatus for counting dust particles in the atmosphere. Proc. Roy. Soc. Edinburgh. 16: 135-172, 1888-1889. In: Collected Scientific Papers of John Aitken, C. G. Knott, ed. p. 207-235.
- \* Aitken, John.  
On the number of dust particles in the air of certain places in Great Britain and on the continent with remarks on the relation between the amount of dust and meteorological phenomena. in: Collected Scientific Papers of John Aitken, C. G. Knott, ed. p. 297-343.
- \* Aitken, John.  
On the number of dust particles in the atmosphere. Trans. Royal Soc. Edinburgh. 35: 1-20, 1888. In: Collected Scientific Papers of John Aitken, C. G. Knott, ed. p. 187-206.
- \* Aitken, John.  
On a simple pocket dust counter. In: Collected Scientific Papers of John Aitken, C. G. Knott, ed. p. 236-246.
- Avy, A. P.  
On the measurement of the dust content of air inside and outside industrial installations. Staub. No. 26: 318-332, 1951. Bull. Hyg. 27: 938, 1952.
- Badham, C ; Rayner, H. M. G.; and Broose, H. D.  
Dust sampling in Sydney sandstone industries. Rept. Director-General Public Health, New South Wales, 1927. No. 12: 74-101, 1927.
- \* Barnes, E. C.  
Dust determinations. Amer. J. Pub. Health. 26: 274-280, 1936. Bull. Hyg. 11: 678, 1936.
- \* Bedford, T.; and Warner, C. G.  
Chronic pulmonary disease in South Wales coalminers. II. Environmental studies. B. Physical studies of the dust hazard and of the thermal environment in certain coal mines. Pt. II-A. Physical study of the dust hazard in certain mines. Collection and evaluation of dust samples. Great Britain Medical Research Council. Special Rept. Series No. 244, 1943. p. 6-18.
- Bloomfield, J. J.  
Dust procedures in air analysis: sampling and analysis of industrial dusts. Amer. Publ Health Assoc. Yearbook, 1935-36. p. 86-97.
- Bloomfield, J. J.; and Dallavalle, J.M.  
Determination and control of industrial dust. U.S. Public Health Bull. No. 217, 1935. 167p.

# I. Condensation.

- \* Bourdillon, R. B. et al.  
Studies in air hygiene. Part II.  
Methods of sampling air for bac-  
teria. Great Britain Medical  
Research Council, Special Rept.  
Series No. 262, 1948. p. 12-53.
- \* Brown, C. E.; and Schrenk, H. E.  
Standard methods for measuring  
the extent of atmospheric pollution.\*  
U.S. Bur. Mines Information Circ.  
#7210, 1942. 19p.
- Cralley, L. V.  
Sampling and analysis of air  
pollutants. Proc. Air Pollution  
Smoke Prevention Assoc. Amer.  
1950: 107-115, 1950.
- Czernotsky, Adolf.  
Method and apparatus for the de- \*  
termination of mists. Chem. Fabrik.  
p. 218-220, 1937.  
Chem. Abstr. 31: 5623<sup>6</sup>.
- \* Dalla Valle, J. M.  
The significance of dust counts.  
Public Health Repts. 54: 1095-1104,  
1939.
- Davidson, W. F.  
A study of atmospheric pollution.  
Monthly Weather Review. 70: 225-234,  
1942.
- Davidson, W. F.; and Master, Warren.  
Automatic dust sampling and  
analyzing instruments for atmos-  
pheric pollution surveys. Monthly  
Weather Review. 69: 257-260, 1941.
- \* Drinker, Philip; and Hatch, Theodore.  
Industrial dust; hygienic  
significance, measurement and con-  
trol. New York, McGraw-Hill, 1936.
- \* Du Buy, H. G.; and Hollaender, A.  
Symposium on air-borne infection;  
sampling devices. Amer. J. Med.  
Sci. 209: 172-177, 1945.
- Duval, René.  
Note on sampling. Ann. Mines.  
138(2): 3-51, 1949.
- Fehnel, J. W.  
Methods of determining dust con-  
centrations. Safety Engin.  
47: 217-220, 1934.
- Feiner, Benjamin.  
Industrial air analysis. II.  
Sampling methods. Modern Sanitation.  
2(1): 19-21, 1950.
- \* Forbes, J. J.; Davenport, Sara J.; and  
Morgis, Genevieve, G.  
Review of literature on dusts.  
Dust sampling methods. U.S. Bur.  
Mines Bulletin 478, 1950. p. 127-148.
- Gibbs, W. E.  
Clouds and smokes; the properties  
of disperse systems in gases and their  
practical applications. London,  
J. & A. Churchill, 1924.
- Goldman, F. H.  
Sampling and analysis of air con-  
taminants. Methods in the war indus-  
tries. Industrial Med. 13: 100-103,  
1944.
- Green, H. L.  
Application of the Aitken effect  
to the study of aerosols. Philoso-  
phical Mag. 4: 1046-1059, 1927.  
Chem. Abstr. 22: 727<sup>8</sup>.
- Green, H. L.  
Some accurate methods of deter-  
mining the number and size frequency  
of particles in dusts. J. Indust.  
Hyg. & Toxicol. 16: 29-39, 1934.  
Chem. Abstr. 28: 2077<sup>3</sup>.
- Green, H. L.; and Watson, H. H.  
Physical methods for the estima-  
tion of dust hazard in industry.  
Great Britain Medical Research  
Council, Special Rept. Series 199,  
1935. 56p.

# I. Condensation.

- \* Greenburg, Leonard.  
The industrial dust problem.  
II. Review of the methods used for sampling aerial dust. Pub. Health Repts. 40: 765-786, 1925.
- \* Greenburg, Leonard.  
Industrial dust problem. III. Comparative field studies of the Falmer apparatus, the konimeter and the impinger methods for sampling aerial dust. Pub. Health Repts. 40: 1591-1603, 1925.
- \* Gurney, S. W.; Williams, O. R.; and Meigs, R. R.  
Investigation of the characteristics of the Bausch & Lomb dust counter. J. Indust. Hyg. & Toxicol. 20: 24-35, 1938.
- Hatch, Theodore; and Thompson, E. W.  
Rapid method of dust sampling and approximate quantitation for routine plant operation. J. Indust. Hyg. & Toxicol. 16: 92-99, 1934. Bull. Hyg. 9: 449, 1934.
- Heymann, B.  
Methods of determining the amount of dust in air. Zent. f. Hyg. 24: 1-38, 1931.
- Hill, E. V.  
Quantitative determination of air dust. Heat. & Vent. Mag. 14(6): 23-33, 1917.
- Holt, P. F.  
The study of dusts in industrial atmospheres. 2. The konimeter and jet sampling instruments. Metallurgia. 43: 203-204, 1951.
- Jøtten, K. W.; and Sartorius, F.  
New apparatus for determining dust. Zent. f. Gewerbehyg. Unfallverhütung. 17: 312-320, 1930. Chem. Abstr. 25: 35245.
- Kagan, M.; and Broumstein, W.  
Rational method for calculating records obtained by means of Owen's jet dust counting apparatus. J. Indust. Hyg. & Toxicol. 13: 10, 1931.
- Katz, S. H.; Smith, G. W.; Meyers, W. M.; Trostel, L. J.; Ingels, M.; and Greenburg, Leonard.  
Comparative tests of instruments for determining atmospheric dust. U.S. Public Health Serv. Bull. 144, 1927.
- Kimball, H. H.; and Hand, I. F.  
Investigation of the dust content of the atmosphere. Monthly Weather Rev. 52: 133-139, 1924. 53: 243-246, 1925. 59: 349-352, 1931.
- \* La Mer, V. K.  
The preparation, collection and measurement of aerosols. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 607-616.
- \* Luckiesh, M.; Holladay, L. L.; and Taylor, A. H.  
Sampling air for bacterial content; new mechanical designs and applications of electrostatic fields. General Elec. Rev. 49(3): 8-17, 1946.
- \* Luckiesh, M.; Taylor, A. H.; and Holladay, L. L.  
Sampling devices for air-borne bacteria. J. Bact. 52: 55-65, 1946.
- \* Luckiesh, M.; Taylor, A. H.; and Knowles, Thomas.  
Sampling devices for determining the bacterial content of air. Rev. Sci. Instr. 20: 73-77, 1949.
- \* McConnell, W. J.; and Thomas, B. G. H.  
Relative values of methods of enumerating bacteria in air. Pub. Health Repts. 40: 2167-2178, 1925.



## I. Condensation.

- \* Magill, P. L.  
Sampling procedures and measuring equipment. Manufacturing Chemists Association, Air Pollution Abatement Manual, 1952. Chap. 6. 39p.
- Nolan, J. J.; and Guerrini, V. H.  
The determination of the mass and size of atmospheric condensation nuclei. Trans. Faraday Soc. 32: 1175-1181, 1936.  
Chem. Abstr. 30: 7243<sup>6</sup>.
- Norman, G. H. C.  
Methods of sampling and dust determination in the mines of Ontario. Amer. Inst. Mining Met. Engrs. Tech. Pub. No. 857, 1937.  
20p. Chem. Abstr. 32: 395<sup>5</sup>.
- Owens, J. S.  
Atmospheric dust. J. Soc. Chem. Indust. 41: 438-443, 1922.  
Chem. Abstr. 17: 321.
- Owens, J. S.  
Automatic measurement of atmospheric pollution. Chem. & Indust. 43: 866-871, 1924.  
Chem. Abstr. 18: 3442.
- Owens, J. S.  
Automatic measurement of atmospheric pollution. Nature. 114: 330-332, 1924.
- Owens, J. S.  
Fundamentals of smoke observation. Methods of measurement. Fuel Econ. Rev. p. 37-38, 54, 1937.
- Owens, J. S.  
Jet dust counting apparatus. 4(12): 522-534, 1923. J. Indust. Hyg. & Toxicol.
- Owens, J. S.  
Suspended impurity in the air. Proc. Roy. Soc. London, Ser. A. 101: 18-37, 1922.
- Pickard, R. H.  
The nature of dust in the air of cotton-card rooms. J. Textile Indust. 21: 595-604<sup>T</sup>, 1930.  
Chem. Abstr. 25: 4132<sup>3</sup>.
- \* Ross, A. A.; and Shaw, N. H.  
Dust hazards in Australian foundries. Tech. Rept. No. 1, Indust. Welfare Div., Dept. of Labour & National Service, Australia, 1943. 45p.
- Selective dust sampling; modified Zeiss Konimeter. Iron & Coal Trades Rev. 128: 840, 1934.
- Shaw, N.; and Owens, J. S.  
The smoke problem of great cities. Constable & Co., Ltd, London, 1928.
- \* Silverman, Leslie.  
Sampling of industrial stacks and effluents for atmospheric pollution control. Proc. 1st Natl. Air Pollution Symposium, 1949.  
p. 55-60, 1951.
- \* Silverman, Leslie; and Williams, C. R.  
Increasing the portability of the Bausch & Lomb dust counter. J. Indust. Hyg. & Toxicol. 21: 67-71, 1937.
- \* Thomas, M. D.  
The present status of the development of instrumentation for the study of air pollution. Proc. 2d Natl. Air Pollution Symposium, 1952. p. 16-23.
- Vigdorick, E.  
Determination of dust in the air by the Owens method. Gg. i Epidem. No. 11: 10-19, 1928.
- Warren, P. H.; and Read, T. A.  
Methods and apparatus for the determination of dust suspended in air. Proc. Australasian Inst. Min. Met. N.S. No. 47: 297-342, 1922.

## I. Condensation.

- \* Whytlaw-Gray, R.; and Patterson, H.S.\* Yellot, J. I.  
Smoke: a study of aerial dis-      Condensation techniques for dust  
perse systems. London, Edward      detection and collection. Proc.  
Arnold & Co., 1932.      U.S. Tech. Conf. on Air Pollution,  
1952. p. 330-340.
- Yant, W. P.; Levy, E.; Sayers, R.R.;  
Brown, C. E.; Traubert, C. E.;  
Frevert, H. W.; and Marshall, K.L.  
Carbon monoxide and particulate  
matter in air of Holland Tunnel and  
metropolitan New York. Bur. Mines  
Rept. Invest. No. 3585, 1941.

## BIBLIOGRAPHY ON

### METHODS OF SAMPLING AIRBORNE PARTICLES.

## II. ELECTRONIC & ELECTROSTATIC METHODS.

- \* Adley, F. E.  
Symposium on the dynamics of  
industrial medicine; studying the  
environment. Arch. Indust. Hyg. &  
Occup. Med. 3: 153-158, 1951.
- Ambler, J. O.  
Stack losses at Arizona Copper Co.  
Chem. Met. Engin. 22: 205-206,  
1920. Chem. Abstr. 14: 2458.
- \* Barnes, E. C.  
Atmospheric sampling by electro-  
static precipitation. Proc. U.S.  
Tech. Conf. on Air Pollution, 1952.  
p. 547-555.
- \* Barnes, E. C.  
Dust determinations. Amer. J.  
Pub. Health. 26: 274-280, 1936.
- Barnes, E. C.  
Electrostatic dust sampler as  
used in sampling lead fumes. Penn.  
Dept. of Labor & Indust., Safe  
Practice Bull. No. 57, No., 1939.
- \* Barnes, E. C.; and Penney, G. W.  
An electrostatic dust weight  
sampler. J. Indust. Hyg. & Toxicol.  
20: 259-265, 1938.
- Barnes, E. C.; and Penney, G. W.  
An electrostatic dust count  
sampler. J. Indust. Hyg. & Toxicol.  
18: 167-172, 1936.  
Bull. Hyg. 11: 522, 1936.
- \* Berry, C. M.  
An electrostatic method for  
collecting bacteria from air.  
Pub. Health Repts. 56: 2044-2051,  
1941.
- Bill, J. P.  
The electrostatic method of  
dust collection as applied to the  
sanitary analysis of air. J. Indust.  
Hyg. & Toxicol. 1: 223-242, 1919.

## II. Electronic & Electrostatic Methods.

Blacktin, S. C.

Efficiencies for particle determination of the electrotor meter, the ultramicroscope, and the settlement counter. J. Soc. Chem. Indust. 61: 161-162, 1942.  
Chem. Abstr. 37: 10635.

Blacktin, S. C.

The electrotor dust and smoke meter. J. Indust. Hyg. & Toxicol. 18: 538-594, 1936.  
Chem. Abstr. 31: 2939.

Blacktin, S. C.

Instrument for both counting and weighing particles of dusts, smokes, and other dispersions. J. Soc. Chem. Indust. 56: 281-283T, 1937.  
Chem. Abstr. 31: 8261<sup>1</sup>.

Blacktin, S. C.

Range of electrotor meter demonstrated by dark field count. J. Indust. Hyg. & Toxicol. 19: 579-589, 1937.  
Chem. Abstr. 32: 2245<sup>8</sup>.

Bloomfield, J. J.

Dust procedures in air analysis; sampling and analysis of industrial dusts. Amer. Pub. Health Assoc. Year Book, 1935-1936. p. 36-97.

Bloomfield, J. J.

Report of subcommittee on dust procedures in air analysis. Review and discussion of new developments in the sampling and counting of industrial dusts. Amer. Pub. Health Assoc. Year Book, 1941. p. 125-129.

Bloomfield, J. J.; and

Dallavalle, J. M.

Determination and control of industrial dust. U.S. Pub. Health Bull. No. 217, 1935. 167p.  
Bull. Hyg. 11: 11-12, 1936.

\* Bourne, H. G.; and Fosdick, L. B.

Collection of mist and dust for particle size measurement; electrostatic precipitation on macrocytometer. Anal. Chem. 22: 1563-1565, 1950.

\* Brown, C. E.; and Schrenk, H.

Relation between and precision of dust counts, (light- and dark-field) from simultaneous impinger, midget impinger, electric precipitator and filter-paper samples. U.S. Bur. Mines, Rept. of Investigations, No. 4568, 1949. 35p.

\* Brown, C. E.; and Schrenk, H. H.

Standard methods for measuring the extent of atmospheric pollution. U.S. Bur. Mines Information Circ. No. 7210, 1942. 19p.

\* Brunetti, Clelio; Magill, P. L.; and Sawyer, F. G.

New developments in instrumentation for air pollution studies. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 643-655.

\* Cadle, R. D.; Rubin, Sylvan;

Glassbrook, C. I.; and Magill, P. L.  
Identification of particles in Los Angeles smog by optical and electron microscopy. Arch. Indust. Hyg. & Toxicol. 2: 698-715, 1950.

\* Cholak, J.; Schafer, L. J.; and Hoffer, R. F.

Collection and analysis of solids in urban atmospheres. Arch. Indust. Hyg. & Occupa. Med. 2: 443-453, 1950.

Cholak, J.

Collection and analysis of solids in city atmospheres. Proc. Air Pollution Smoke Prevention Assoc. Amer. 1950: 33-41, 1950.

## II. Electronic & Electrostatic Methods.

- \* Clayton, G. D.  
Improvement of the M. S. A.  
electrostatic precipitator. J.  
Indust. Hyg. & Toxicol. 22: 400-402,  
1947.
- Cottrell, F. G.  
The electrical precipitation of  
suspended particles. J. Indust.  
Engin. Chem. 3: 542-550, 1911.
- Cralley, L. V.  
Sampling and analysis of air  
pollutants. Proc. Air Pollution  
Smoke Prevention Assoc. 1950: 107-  
115, 1950.
- \* Crozier, W. D.  
Airborne particle study. New  
Mexico School of Mines, Res. &  
Develop. Div. Contract N7ONR-405,  
Task 1, Proj. Designation No.  
NR-082-013. Reports.
- \* Daniel, J. H.; and Brackett, F. S.  
Electrical method for investiga-  
ting the nature and behavior of  
small, airborne, charged particles.  
J. Appl. Physics. 22: 542-554,  
1951.
- \* Daniel, J. H.; and Brackett, F. S.  
Investigation of small, airborne,  
charged particles by an electrical  
method. Arch. Indust. Hyg. &  
Occup. Med. 3: 505-519, 1951.
- Drinker, Philip.  
Alternating current precipitators  
for sanitary air analysis. I. An  
inexpensive precipitator unit. J.  
Indust. Hyg. & Toxic. 14: 364-367,  
1932.
- \* Drinker, Philip; and Hatch, Theodore.  
Industrial dust; hygienic sig-  
nificance, measurement and control.  
New York, McGraw-Hill, 1936.
- Drinker, Philip; and Thomson, R. M.  
The determination of suspensions by  
alternating-current precipitation.  
J. Indust. Hyg. & Toxicol.  
7: 261-272, 1925.
- Drinker, Philip; and Thomson, R. M.  
Improved form of the Drinker,  
Thomson, Fitchet dust sampler.  
J. Indust. Hyg. & Toxicol.  
7: 352-357, 1925.
- Drinker, Philip; Thomson, R. M.; and  
Fitchet, S. M.  
Atmospheric particulate matter.  
II. The use of electric precipita-  
tion for quantitative determinations  
and microscopy. J. Indust. Hyg. &  
Toxicol. 5: 162-185, 1923.  
Chem. Abstr. 17: 3733.
- \* Forbes, J. J.; Davenport, Sara J.;  
and Morgis, Genevieve, G.  
Review of literature on dusts.  
p. 127-148, Dust sampling methods.  
U.S. Bur. Mines Bulletin 478, 1950.  
333p.
- \* Gibbs, W. E.  
Clouds and smokes; the properties  
of disperse systems in gases and  
their practical applications.  
London, J. & A. Churchill, 1924.
- Geist, J. M.  
An electronic spray analyzer for  
electrically conducting particles.  
PhD Thesis, Univ. of Michigan, 1951.  
Dissertation Abstr. 12: 167, 1952.
- \* Geist, J. M.; York, J. L.; and  
Brown, G. G.  
Electronic spray analyzer for  
electrically conducting particles.  
Indust. & Engin. Chem.  
43: 1371-1377, 1951.
- \* Gillespie, T.; and Langstroth, G.O.  
An instrument for determining  
the electric-charge distribution in  
aerosols. Canad. J. Chem.  
30: 1056-1068, 1952.

## II. Electronic & Electrostatic Methods.

- \* Gucker, F. T.  
Aerosols. Scientific Monthly.  
68: 373-385, 1949.
- \* Gitzen, W. H.  
Identification of free silica  
in dusts and fumes. Anal. Chem.  
20: 265-267, 1948.
- Green, H. L.; and Watson, H. H.  
Physical methods for the estimation  
of dust hazard in industry.  
Great Britain Medical Res. Council.  
Special Rept. Series 199, 1935.  
56p. Bull. Hyg. 10: 291-292, 1935.
- \* Greenburg, Leonard.  
The industrial dust problem. II.  
Review of the methods used for  
sampling aerial dust. Pub. Health  
Repts. 40: 765-786, 1925.
- \* Gucker, F. T.  
Instrumental methods of measuring  
mass concentration and particulate  
concentration in aerosols. Proc.  
U.S. Tech. Conference on Air  
Pollution, 1952. p. 617-633.
- \* Gucker, F. T.  
Instrumental methods of studying  
some properties of aerosols.  
Science. 110: 372-374, 1949.
- \* Gucker, F. T.; and O'Konski, C. T.  
Electronic methods of counting  
aerosol particles. Chem. Rev.  
44: 373-388, 1949.
- \* Gucker, F. T.; Pickard, H. B.; and  
O'Konski, C. T.  
Methods of testing smoke filters.  
U.S. Atomic Energy Comm., Handbook  
on Aerosols, 1950. p. 123-136.
- \* Guyton, A. C.  
Electronic counting and size  
determination of particles in  
aerosols. J. Indust. Hyg. &  
Toxicol. 28: 133-141, 1946.
- Hazard, W. G.; and Ishikawa, Tomoyoshi.  
Alternating current precipitators  
for sanitary air analysis. II. Acid  
formation in electric precipitators.  
J. Indust. Hyg. & Toxicol.  
14: 367-370, 1932.  
Chem. Abstr. 27: 12815.
- \* Hossey, A. D.; and Jones, H. H.  
Portable electrostatic precipitator  
operating from 110 volts a.c. or six  
volts, d.c. Arch. Indust. Hyg. &  
Occupa. Med. 7: 49-57, 1953.
- \* Keenan, R. G.; and Fairhall, L. T.  
Absolute efficiency of the impinger  
and of the electrostatic precipitator  
in the sampling of air containing  
metallic lead fume. J. Indust. Hyg.  
& Toxicol. 26: 241-249, 1944.
- \* Kay, Kingsley.  
Analytical methods used in air  
pollution study. Indust. Engin.  
Chem. 44: 1383-1388, 1952.
- Lamb, A. B.; Wendt, G. L.; and  
Wilson, R. E.  
Portable electrical filter for  
smokes and bacteria. Trans. Amer.  
Electrochem. Soc. 35: 357-369, 1919.
- \* Lea, W. L.  
Portable electrostatic precipitator.  
J. Indust. Hyg. & Toxicol.  
25: 152-156, 1943.
- Lipscomb, W. N.; Rubin, T. R.; and  
Sturdivant, J. H.  
Investigation of a method for  
analysis of smokes according to  
particle size. J. Appl. Physics.  
18: 72-79, 1947.
- Litvinoff, D. J.  
An electrofilter for the  
collection of dust samples from the  
air. Gigena. 10: 22-26, 1951.  
Chem. Abstr. 46: 1305d.

## II. Electronic & Electrostatic Methods.

- Lodge, O.  
The electric disposition of dust, smoke etc. J. Soc. Chem. Indust. 5: 572, 1886.
- Lodge, O.  
Historical note on dust, electrification and heat. Nature. 71: 582, 1904-05.
- \* Loeper, M.; Cottet, J.; and Jost, M.  
Electrostatic determination of aerosols. Compt. Rend. Soc. Biol. 138: 349-350, 1944.
- \* Los Angeles County. Pollution Control District.  
Technical and administrative report on air pollution in Los Angeles County. Annual Report, 1949-1950. Los Angeles, 1950. 49p.
- \* Los Angeles County. Air Pollution Control District. Engineering and Research Divisions.  
Test procedures and methods in air pollution control. Los Angeles County, n.d., 60p.
- \* Luckiesh, M.; Holladay, L. L.; and Taylor, A. H.  
Sampling air for bacterial content; new mechanical designs and applications of electrostatic fields. General Elec. Rev. 49(3): 8-17, 1946.
- \* Luckiesh, M.; and Taylor, A. H.  
Determining and reducing the concentration of air-borne micro-organisms. Heating-Piping & Air Conditioning. 19(1): 113-117, 1947.
- \* McCabe, L. C.  
Atmospheric pollution; techniques for microsampling. Indust. & Engin. Chem. 42(11): 115A-116A, 1950.
- McCloud, G. F.; and Smith, L. M.  
Deposits of insecticidal dusts and diluents on charged plates. J. Agric. Res. 66: 87-95, 1942.
- Magill, P. L.  
Determination procedures. Amer. Indust. Hyg. Assoc. Quart. 11: 55-63, 1950.  
Chem. Abstr. 45: 2612f.
- \* Magill, P. L.  
Sampling procedures and measuring equipment. Manufacturing Chemists Association Air Pollution Abatement Manual, 1952. Chap. 6. 39p.
- \* Magill, P. L.  
Techniques employed in the analysis of Los Angeles Smog. Proc. 1st. Natl. Air Pollution Symposium, 1949. p. 61-68.
- \* Microbe trap; duplex electrostatic air sampler. Sci. Amer. 175: 126, 1946.
- \* Munder, D. L.  
Large scale filtration and purification of air supplies, with special reference to electrostatic precipitator. J. Appl. Chem. 2: 65-68, 1952.
- \* Munger, H. P.  
Air pollution at low altitudes. Techniques for study. Chem. Engin. Prog. 47: 436-439, 1951.
- Oldham, P. D.; and Roach, S. A.  
A sampling procedure for measuring industrial dust exposure. Brit. J. Indust. Med. 9: 112-119, 1952.  
Bull. Hyg. 27: 938, 1952.
- \* Patrik, E. A. K.  
Electrostatic method for determining dust in wet gases. J. Soc. Chem. Indust. 66: 249-253, 1947.

## II. Electronic & Electrostatic Methods.

- Patterson, H. S.; and  
Whytlaw-Gray, R.  
On the densities of particles in  
smokes. Proc. Roy. Soc. London.  
A113: 302-311, 1926.
- Penny, G. W.  
A new electrostatic precipitator.  
Elec. Engin. 56(1): 159, 1937.
- Piazza, José.  
Experiments for the precipitation  
of aerosols. Anales Soc. Cient.  
Argentina. 137: 49-81, 1944.  
Chem. Abstr. 39: 10965.
- Report of subcommittee on dust  
procedures in air analysis. Review  
and discussion of new developments  
in the sampling and counting of  
industrial dusts. Amer. Pub.  
Health Assoc. Year Book. p. 125-29,  
1940-1941.
- \* Book, R.  
Device for electrostatic pre-  
cipitation of bacteria and fungus  
spores upon culture plates.  
J. Allergy. 10: 200-205, 1948.
- Rubin, Sylvan.  
Liquid particles in atmospheric  
haze. J. Atmospheric & Terrestrial  
Physics. 2(2): 130-140, 1952.
- \* Schadt, Conrad; Magill, P. L.;  
Cadle, R. D.; and Ney, Iuman.  
An electrostatic precipitator  
for the continuous sampling of  
sulfuric acid aerosols and other air  
borne particulate electrolytes.  
Arch. Indust. Hyg. & Occupa. Med.  
1: 556-564, 1950.
- \* Schmidt, W. A.  
Electrical precipitation and  
mechanical dust collection. Indust.  
Engin. Chem. 41: 2428-2434, 1949.
- Schmidt, W. A.; and Anderson, E.  
Electrical precipitation. Elec.  
Engin. 57: 332-338, 1938.
- \* Schmidt, W. A.; and Flodin, C. R.  
Fundamental principles, design,  
application, performance and limita-  
tions of electrical precipitation  
equipment. Proc. U.S. Tech. Conf. on  
Air Pollution, 1952. p. 373-381.
- \* Schrenk, H. H.  
Rapid methods for the estimation  
of air dustiness. Amer. J. Pub.  
Health. 30: 1183-1189, 1940.
- \* Seifert, H. E.; Keenan, R. G.; and  
Fairhall, L. T.  
Procedure for handling of field  
samples of dust and fume. Pub.  
Health Repts. 60: 441-443, 1945.
- Setterlind, A. N.  
An appraisal of present-day  
field instruments. Amer. Indust.  
Hyg. Assoc. Quart. 9: 35-45, 1948.  
Chem. Abstr. 44: 1285c.
- \* Silverman, Leslie.  
Sampling of industrial stacks and  
effluents for atmospheric-pollution  
control. Proc. 1st Natl. Air  
Pollution Symposium 1949. p. 55-60,  
1951.
- Smith, R. G.  
Fundamental methods of atmospheric  
sampling. Amer. Indust. Hyg. Assoc.  
Quart. 11: 7-10, 1950.
- \* Sproull, W. T.; and Nakada, Yoshinao.  
Operation of Cottrell precipitators.  
Effect of moisture and temperature.  
Indust. & Engin. Chem. 43: 1350-  
1357, 1951.
- Stairmand, C. J.  
Sampling of dust-laden gases.  
Trans. Inst. Chem. Engrs.  
29: 15-44, 1951.  
Chem. Abstr. 46: 6869h.

## II. Electronic & Electrostatic Methods.

- \* Stanford Research Institute.  
Second interim report on the smog problem in Los Angeles County. Chap. III. Analysis of the air-particulate matter. Los Angeles, Western Oil & Gas Assoc., 1949. p. 22-29.
- \* Stoecker, W. F.  
Smoke-density measurement. Correlation of solids content in gas with photoelectric smoke meter readings. Mech. Engin. 72: 793-798, 1950.
- \* Stokinger, H. E.; and Laskin, Sidney.  
Air pollution and the particle-size toxicity problems. II. Nucleonics. 6(3): 15-31, 1950.
- \* Thomas, M. D.; and Ivie, J. O.  
Automatic apparatus for the determination of small concentrations of sulfur dioxide and other contaminants in the atmosphere. U.S. Tech. Conf. on Air Pollution, 1952. p. 567-579.
- \* Tolman, R. G.; Reyerson, L. H.; Brooks, A. P.; and Smyth, M. O.  
An electrical precipitator for analyzing smokes. J. Amer. Chem. Soc. 41: 587-589, 1919.
- \* Walton, W. H.  
Automatic counting of microscopic particles. Nature. 169: 518-520, 1952.
- Weber, H. C.  
Quantitative analysis of mists and fogs, especially acid mists. J. Indust. Engin. Chem. 16: E39-1242, 1924.
- Wilner, T.  
Electric gas filter for analytical purposes. Amer. Indust. Hyg. Assoc. Quart. 12: 115-116, 1951. Chem. Abstr. 45: 8817e.
- Wilner, T.  
Electric gas filter for analytical purposes. Svensk. Kem. Tid. 63: 141-144, 1951. (In English)
- \* Winslow, C. E. A. et al.  
Report of the committee on standard methods for the examination of the air. Amer. J. Pub. Health. 10: 450-454, 1920.



BIBLIOGRAPHY ON  
METHODS OF SAMPLING AIRBORNE PARTICLES.

III. FILTRATION.

- \* Adley, F. E.  
Symposium on the dynamics of industrial medicine; studying the environment. Arch. Indust. Hyg. & Occupa. Med. 3: 153-158, 1951.
- Alekseeva, M. V.; and Andronov, B. E.  
A new method for the absorption of aerosols. Lab. Prakt. No. 5: 29, 1939.  
Chem. Abstr. 33: 7624<sup>5</sup>
- Allner, W.  
A new method for the determination of dust and other constituents in industrial gases. Braunkohle. 24: 378-383; 399-402, 1925.  
Chem. Abstr. 19: 3074.
- Anderson, E.  
Some factors and principles involved in the separation and collection of dust, mist and fume from gases. Trans. Amer. Inst. Chem. Engrs. 16: 69, 1925.
- Arbogast, A. H.  
Determination of dust in gas. Iron Steel Engin. 25(10): 82-89, 1948.
- Avy, A. P.  
On the measurement of the dust content of air inside and outside industrial installations. Staub. No. 26: 318-322, 1951.  
Bull. Hyg. 27: 938, 1952.
- \* Avy, Alban; and Bailleres, Raymond.  
The determination of solid particles in dusts and smokes. Compt. Rend. Acad. Sci. 217: 605-607, 1943.
- Bal'son, B. F.  
Study of methods for the determination of dust in gases. Trans. Thermo-Tech. Inst., Moscow. No. 6: 16-23, 1934.  
Chem. Abstr. 29: 3262<sup>5</sup>.
- Bangert, Fr.  
Problems of filtration of very fine aerosols. Staub. June 15, 1951. p. 158-171.
- \* Bayrer, O.; and Hough, W. A.  
A lead fume sampling apparatus. J. Indust. Hyg. & Toxicol. 27: 89-92, 1945.
- \* Bedford, T.; and Warner, C. G.  
Measurements of concentrations of air borne dusts. J. Indust. Hyg. & Toxicol. 24: 315-321, 1942.
- \* Birse, E. A. B.; and Roberts, J. K.  
Action and design of mechanical filters for dust and smoke. Trans. Faraday Soc. 44: 273-278, 1948.
- Bloomfield, J. J.  
Report of subcommittee on dust procedures in air analysis. Review and discussion of new developments in the sampling and counting of industrial dusts. Amer. Pub. Health Assoc. Year Book, 1940. p. 125-129.
- Bloomfield, J. J.; and Dallavalle, J. M.  
Determination and control of industrial dust. U.S. Pub. Health Bull. No. 217, 1935. 167p.  
Bull. Hyg. 11: 11-12, 1936.

### III. Filtration.

- Born, H. J.; and Zimmer, K. G.  
Investigation of smoke filters  
by means of radioactive smoke  
materials. *Gasmaske*. 12: 25-29,  
1940. *Chem. Abstr.* 35: 1963<sup>6</sup>.
- Bourne, H. G.; and Streett, L. P.  
The use of filter paper for  
collecting aerosols. *Paper Trade  
J.* 130: 21-24, 1950.  
*Chem. Abstr.* 44: 86521.
- Boyd, James.  
Sampling of dust in mine air.  
*Eng. Mining J.* 107: 395-396, 1919.
- Briscoe, H. V. A.; and Matthews, J. W.  
Study of dangerous dusts.  
Methods of collecting samples for  
analysis. *Mikrochim Acta*.  
1: 266-283, 1937.  
*Chem. Abstr.* 31: 7796<sup>6</sup>.
- Brown, O. E.  
Filter-paper methods for obtaining  
dust-concentration results comparable  
to impinger results. U.S. Bur.  
Mines Rept. Invest. No. 3788, 1944.  
20p. *Chem. Abstr.* 39: 1089<sup>8</sup>.
- Brown, O. E.; Beatty, R. L.; and  
Kirby, T. B.  
Dust-counting cells. U.S. Bur.  
Mines Informa. Circ. No. 7331, 1945.  
9p. *Chem. Abstr.* 39: 5133<sup>9</sup>.
- \* Brown, O. E.; and Schrenk, H.  
Relation between and precision  
of dust counts, (light- and dark-  
field) from simultaneous impinger,  
midget impinger, electric precipita-  
tor and filter paper samples.  
U.S. Bur. Mines Rept. of Inves.  
No. 4568, 1949. 35p.
- \* Brown, O. E.; and Schrenk, H.  
Standard methods for measuring  
the extent of atmospheric pollution.  
U.S. Bur. Mines Informa. Circ.  
No. 7210, 1942. 19p.
- Bryan, A. M.; and Smellie, J.  
The estimation of dust in mine  
atmosphere. *J. Roy. Tech. Coll.*  
3: 671-681, 1936.
- Cauer, H.  
Sampling apparatus for chemical-  
climatological and technical air  
analysis. *Zeitschr. f. anal. Chem.*  
103: 166-188, 1935.  
*Chem. Abstr.* 30: 906<sup>2</sup>.
- Cralley, L. V.  
Sampling and analysis of air  
pollutants. *Proc. Air Pollution  
Smoke Prev. Assoc. Amer.* p. 107-115,  
1950.
- Dalla Valle, J. M.  
Air filters for control of air-  
borne bacteria. *Heat. & Vent.*  
41(4): 54-59, 1944.
- \* Dalla Valle, J. M.; and  
Hollaender, Alexander.  
The effectiveness of certain types  
of commercial air filters against  
bacteria. *Pub. Health Repts.*  
54: 695-699, 1939.
- Davidson, W. F.  
A study of atmospheric pollution.  
*Monthly Weather Rev.* 70: 225-234,  
1942.
- Davidson, W. F.; and Master, Warren.  
Automatic dust sampling and  
analysing instruments for atmospheric  
pollution surveys. *Monthly Weather  
Rev.* 69: 257-260, 1941.
- \* Drinker, Philip; and Hatch, Theodore.  
Industrial dust; hygienic  
significance, measurement and  
control. New York, McGraw-Hill,  
1936.
- \* Feiner, Benjamin.  
Industrial air analysis. II.  
Sampling methods. *Modern Sanit.*  
2(1): 19-21, 1950.

### III. Filtration.

Fieldner, A. C.; Katz, S. H.; and Longfellow, E. S.

The sugar-tube method of determining rock dust in air. Bur. Mines Tech. Paper 278, 1921. 42p.

Filtration of monodisperse electrically charged aerosols; Part I. Filtration of charged and uncharged aerosol particles. Part II. The effect of droplet curvature on the growth and size distribution of aerosols. Part III. Effect of charging on liquid droplet radii. NYO-514. June 30, 1952.

- \* First, M. W.; and Silverman, Leslie. Air sampling with membrane filters. Arch. Indust. Hyg. & Occupa. Med. 7: 1-11, 1953.

- \* Forbes, J. J.; Davenport, Sara J.; and Morgis, Genevieve G. Review of literature on dusts. p. 127-148, Dust sampling methods. U.S. Bur Mines Bull. 478, 1950. 333p.

Frankland, P. F.

A new method for the quantitative estimation of micro-organisms present in the atmosphere. Phil. Trans. Roy. Soc. London. A178: 113-152, 1886.

- \* Gibbs, W. E. Clouds and smokes; the properties of disperse systems in gases and their practical applications. London, J. & A. Churchill, 1924.

Gisclard, J. B.

A modified beaded column for absorbing gases and mists. Ind. Met. 14: 366-367, 1945. Chem. Abstr. 39: 3978.

- \* Goetz, Alexander. Application of molecular filter membranes to the analysis of aerobols. Amer. J. Pub. Health. 43: 150-159, 1953.

Goodeve, C. F.

The removal of mist by centrifugal methods. Trans. Faraday Soc. 32: 1218-1223, 1936. Chem. Abstr. 30: 72447.

Graham, J. I.; and Lawrence, F.

The collection and analysis of air-borne dust during the driving of hard-headings. Trans. Inst. Mining Engin. 92: 1-18, 1936. Bull. Hyg. 12: 843, 1937.

Green, H. L.

Recent developments in methods of sampling dusts. Inst. Min. & Met. Bull. 362, 1934. 21p. Chem. Abstr. 29: 61057.

Green, H. L.; and Watson, H. H.

Physical methods for the estimation of dust hazard in industry. Great Britain Med. Res. Council, Special Rept. Series 199, 1935. 56p. Bull. Hyg. 10: 291-292, 1935.

- \* Greenburg, Leonard.

The industrial dust problem. II. Review of the methods used for sampling aerial dust. Pub. Health Repts. 40: 765-786, 1925.

Griffiths, J. H.; and Jones, T. D.

Determination of dust concentrations in mine atmospheres. Trans. Inst. Mining Eng. 99: 150-180, 1940.

- \* Gucker, F. T.; Pickard, H. B.; and O'Konski, C. T.

The methods of testing smoke filters. U.S. Atomic Energy Comm. Handbook on Aerosols, 1950. p. 123-136.

- \* Hall, S. R.

Evaluation of particulate concentrations with collecting apparatus. Anal. Chem. 24: 996-1000, 1952.

### III. Filtration.

- Hasselt. Institut d'Hygiene des Mines.  
Konimetry. Construction and use of a filtering apparatus for the determination of atmospheric dust content. Communication No. 22. *Gén.* 35, 1947. 8p.  
*Bull. Hyg.* 22: 703, 1947.
- Hasselt. Institut d'Hygiene des Mines.  
Comparative results of simultaneous sampling by means of the thermal precipitator, midget impinger and Soxhlet thimble. *Gén.* 179. 1952. 17p.  
*Bull. Hyg.* 27: 938, 1952.
- \* Hebley, H. F.  
Factors rarely considered in smoke abatement. *Mech. Eng.* 69: 281-287, 1947.
- Hettche, H. O.; and Schwab, A.  
A new method for determining bacterial count of air. *Arch. f. Hyg.* 123: 283-290, 1940.
- Heymann, B.  
Methods of determining the amount of dust in air. *Zent. f. Hyg.* 24: 1-38, 1931.
- Hill, A. S. G.  
Measurement of the optical densities of smoke stains on filter papers. *Trans. Faraday Soc.* 32: 1125-1131, 1936.  
*Chem. Abstr.* 30: 72426.
- Holt, P. F.  
The determination of the mass concentration of air borne dusts; an electrical sampling pump for use with volatile filters. *Trans. Inst. Min. & Metall.* 61 (pt 1): 15, 1951-52.
- Holt, P. F.  
The mass concentration of airborne dusts; use of dimethylterephthalate as a filter base in its determination. *Metallurgia.* 45: 156-167, 1952.
- Holt, P. F.  
The study of dusts in industrial atmospheres. 4. Determination of mass concentration. *Metallurgia.* 43: 309-310, 1951.  
*Chem. Abstr.* 45: 7727f.
- Holt, P. F.  
The study of dusts in industrial atmospheres. 5. Determination of mass concentration by volatile filter method. *Metallurgia.* 44: 52-54, 1952.  
*Chem. Abstr.* 45: 9197i.
- \* Holt, P. F.; and Chalk, A. J.  
New method for monitoring air-borne dust. *Arch. Indust. Hyg. & Occupa. Med.* 7: 404-410, 1953.
- Holt, P. F.  
The determination of the mass concentration of air-borne dusts; an apparatus for the sublimation of volatile filter bases. *Bull. Inst. Mining. Met.* No. 518: 1-2, 1950.  
*Chem. Abstr.* 44: 2673i.
- Jessop, S. M.  
Dry fibrous filters. *Armed Forces Chem. J.* 5(1): 45, 1951.
- Jøtten, K. W.; and Grube, H. P.  
New method of estimating small quantities of dust. *Arch. f. Hyg. Bakt.* 111: 63-74, 1933.
- Katz, S. H.  
Filtration law for aerosols. *Armed Forces Chem. J.* 3(7): 14-16, 1950.
- Katz, S. H.; and Smith, G. W.  
Determination of suspended matter in gases by collection on filter paper. *U. S. Bur. Mines Rept. Invest. No.* 2378, 1922. 6p.

### III. Filtration.

- Katz, S. H.; Smith, G. W.; and Meyers, W. M.  
Determinations of air dustiness with the sugar tube, Palmer apparatus and impinger, compared with determinations with the konimeter. J. Indust. Hyg. & Toxicol. 8: 300-306, 1926.
- Katz, S. H.; Smith, G. W.; Meyers, W. M.; Trostel, L. J.; Ingels, M.; and Greenburg, L.  
Comparative tests of instruments for determining atmospheric dust. U.S. Pub. Health Serv. Bull. 144, 1927.
- \* Kay, Kingsley.  
Analytical methods used in air pollution study. Indust. Engin. Chem. 44: 1383-1388, 1952.
- \* Kelly, C. D.  
Aerobiological sampling methods from aircraft. Canad. J. Pub. Health. 42(2): 71, 1951.
- \* Kelly, C. D.; and Pady, S. M.  
Microbiological studies of air over some non-arctic regions of Canada. Canad. J. Botany. 31: 90-106, 1953.
- \* La Mer, V. K.  
The preparation, collection and measurement of aerosols. Proc. 1st. Natl. Air Pollution Symposium. p. 5-13, 1949.
- Lloyd, H.; Winder, G. E.; and Gillard, D. A.  
An automatic dust sampler. Safety in mines Research Establishment, Portobello, St. Sheffield. Research Rept. No. 29, 1951. 19p. Bull. Hyg. 27: 1122, 1952.
- \* Los Angeles County. Pollution Control District.  
Technical and administrative report on air pollution in Los Angeles County. Annual Report, 1949-1950. Los Angeles, 1950. 49p.
- \* Los Angeles County. Air Pollution Control District. Engineering and Research Divisions.  
Test procedures and methods in air pollution control. Los Angeles County, n.d. 60p.
- \* McConnell, W. J.; and Thomas, B.G.H.  
Relative values of methods of enumerating bacteria in air. Pub. Health Repts. 40: 2167-2178, 1925.
- \* Mader, P. P.; McPhee, R. D.; Lofberg, R. T.; and Larson, G. P.  
Composition of organic portion of atmospheric aerosols in the Los Angeles area. Indust. & Engin. Chem. 44: 1352-1355, 1952.
- \* Magill, P. L.  
Determination procedures. Amer. Indust. Hyg. Assoc. Quart. 11: 55-63, 1950. Chem. Abstr. 45: 2612f.
- \* Magill, P. L.  
Sampling procedures and measuring equipment. Manufacturing Chemists Association Air Pollution Abatement Manual, 1952. Chap. 6. 39p.
- Matthews, Janet W.; and Briscoe, H.V.A.  
Volatile solid filters for dust sampling. Bull. Inst. Mining Met. No. 362. 12p. 1934. No. 363, p. 1-31; 36-42, 1934.
- Matthews, Janet W.; Holt, P. F.; Sanderson, P. M.; and Briscoe, H.V.A.  
Porous solid filters for sampling industrial dusts. J. Chem. Met. & Min. Soc. South Africa. 37: 161-166, 1936.
- Matthews, Janet W.; Sanderson, P. M.; and Briscoe, H. V. A.  
Porous solid filters for sampling industrial dusts. Bull. Inst. Mining Met. No. 387, 1936. p. 1-31.

### III. Filtration.

Mavrogordato, A.

The value of the konimeter - being an investigation into the methods and results of dust sampling as at present practiced in the mines of Witwatersrand. South African Inst. Med. Res. Pub. No. 17, 1923. 71p.

\* May, J. W.

Viscous impingement filters. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 273-279.

Miquel, P.

Microscopic analysis of air by means of soluble filters. Ann. Microgr. 1: 153-167, 1888.

Mitchell, R. B.; Stumm, P. W. et al.

Studies on microorganisms of the upper atmosphere; the development of a soluble collection filter for microorganisms present in the air. Randolph Field, 1949. Form Report No. 2. Proj. No. 21-02-118, U.S. School of Aviation Medicine, 1949.

Mitchell, R. B.; Timmons, D. E.; and Dorris, H. W.

Studies on microorganisms of the upper atmosphere. I. Development of methods and material. J. Aviat. Med. 22: 214-224, 1951. Excerpta Med. IV. #69, 1952.

\* Munder, D. L.

Large scale filtration and purification of air supplies, with special reference to electrostatic precipitator. J. Appl. Chem. 2: 65-68, 1952.

Norman, G. H. C.

Methods of sampling and dust determination in the mines of Ontario. Amer. Inst. Mining Met. Engrs. Tech. Pub. No. 857, 1937. 20p. Chem. Abstr. 32: 395.

Oesterle, P.

Dry soluble filter for counting bacteria. Arch. f. Hyg. 113: 137-42, 1934.

Oesterle, P.; and Braunert, R.

Determination of the bacterial content of the air at different heights in the laboratory by means of soluble dry filters. Arch. f. Hyg. 120: 295-303, 1938. Bull. Hyg. 14: 104, 1939.

Oesterle, P.; and Braunert, R.

Differences in bacterial content of air at different heights above work table when soluble dry filter is used; method of studying air-borne infections. Arch. f. Hyg. 120: 295-303, 1938.

Owens, J. S.

Automatic measurement of atmospheric pollution. Chem. & Indust. 43: 866-871, 1924.

Pakhomychev, A.

Determination of the dispersion of dust in the air. Hig. y Sanit. No. 12: 36-42, 1939. Chem. Abstr. 36: 38715.

Palmer, G. T.; Coleman, L. V.; and Ward, H. C.

A study of the methods for determining air dustiness. Amer. J. Pub. Health. 6: 1049-1075, 1916.

\* Perkins, W. A.; Leighton, P. A.; Grinnet, S. W.; and Webster, F. X.

A fluorescent atmospheric tracer technique for mesometeorological research. Proc. 2d Natl. Air Pollution Symposium, 1952. p. 42-46.

\* Ramskill, E. A.; and Anderson, W. L.

The inertial mechanism in the mechanical filtration of aerosols. J. Colloid Sci. 6: 416-428, 1951.

### III. Filtration.

- \* Ranz, W. M.; and Wong, J. B.  
Impaction of dust and smoke particles on surface and body collectors. Indust. Engin. Chem. 44: 1371-1381, 1952.  
  
Report of subcommittee on dust procedures in air analysis. Review and discussion of new developments in the sampling and counting of industrial dusts. Amer. Pub. Health Assoc. Year Book. p. 125-129, 1940-1941.
- Reznik, I. B.  
New method for the determination of the degree of pollution of the atmosphere with dust. Hig. Truda. 15(2): 51-57, 1937.  
Chem. Abstr. 32: 42607.
- Roche, Louis.  
Measurement of dust concentration in the atmosphere. Rev. Ind. Minerale. No. 509: 205-210, 1946.  
Chem. Abstr. 41: 29436.
- Rowley, F. B.  
The dust problem in air conditioning. Heating, Piping & Air Conditioning. 7: 293-299, 1935.
- \* Schrenk, H. H.  
Rapid methods for the estimation of air dustiness. Amer. J. Pub. Health. 30: 1183-1189, 1940.
- \* Sehl, F. W.; and Havens, B. J.  
A modified air sampler employing fiberglass. Arch. Indust. Hyg. & Occupa. Med. 3: 98-100, 1951.
- Setterlind, A. N.  
An appraisal of present day field instruments. Amer. Indust. Hyg. Assoc. Quart. 9: 35-45, 1948.  
Chem. Abstr. 44: 1285c.
- Silverman, Leslie.  
Filtration through porous materials. Amer. Indust. Hyg. Assoc. Quart. 11: 11-20, 1950.
- \* Silverman, Leslie.  
Performance of industrial aerosol filters. Chem. Engin. Prog. 47: 462-468, 1951.
- \* Silverman, Leslie.  
Sampling of industrial stacks and effluents for atmospheric pollution control. Proc. 1st. Natl. Air Pollution Symposium, 1949. p. 55-60.
- \* Silverman, Leslie; and Ege, J. F.  
A filter paper method for lead fume collection. J. Indust. Hyg. & Toxicol. 25: 185-188, 1943.
- \* Silverman, Leslie; and Viles, F. J.  
High volume air sampling and filter weighing method for certain aerosols. J. Indust. Hyg. & Toxicol. 30: 124-128, 1948.
- \* Silverman, Leslie; and Williams, C.R.  
An apparatus for rapid sampling of large air volumes for industrial air analysis. J. Indust. Hyg. & Toxicol. 28: 21-25, 1946.
- \* Skrzynsak, J. Z.  
The microbiological examination of the troposphere with consideration of the meteorological influences. Medycyna Doswiadczalna i Mikrob. 1(2): 296-343, 1949.  
(English Summary).
- Smith, Ralph G.  
Fundamental methods of atmospheric sampling. Amer. Indust. Hyg. Assoc. Quart. 11: 7-10, 1950.
- \* Smith, W. J.; and Stafford, Earl.  
Development of a dry fibrous filter. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 264-272.
- Smyth, H. G.  
A critical review of methods for the study of dust content of air. J. Indust. Hyg. 1: 140-149, 1919.

### III. Filtration.

- \* Stafford, Earl; and Smith, W. J.  
Dry fibrous air filter media.  
Performance characteristics.  
Indust. & Engin. Chem.  
43: 1346-1350, 1951.
- Stairmand, C. J.  
Sampling of dust-laden gases.  
Trans. Inst. Chem. Engrs.  
29: 15-44, 1951.  
Chem. Abstr. 46: 6869h.
- \* Stoecker, W. F.  
Smoke density measurement.  
Correlation of solids content in  
gas with photoelectric smoke meter  
readings. Mech. Engin.  
72: 793-798, 1950.
- \* Stokinger, H. E.; and Laskin, Sidney.  
Air pollution and the particle-  
size toxicity problem. II.  
Nucleonics. 6(3): 15-31, 1950.
- Terjessen, S. G.; and Cherry, G. B.  
The removal of microorganisms  
from air by filtration. Trans.  
Inst. Chem. Engrs., North West  
Branch, Manchester. Proof copy,  
Oct., 1947. 8p.  
Chem. Abstr. 42: 5593d.
- \* Thomas, M. D.  
The present status of the  
development of instrumentation for  
the study of air pollution. Proc.  
2d. Natl. Air Pollution Symposium,  
1952. p. 16-23.
- Trostal, J.; and Frevert, H. W.  
Collection and examination of  
explosive dusts in air. J. Indust.  
Engin. Chem. 15: 232, 1923.
- \* Varga, F. B.; and Newton, R. H.  
Sampling and analysis of entrained  
matter in gases. Indust. Engin.  
Chem. Anal. Ed. 7: 240-242, 1935.
- Vigdorick, E.  
Determination of dust in the air  
by the Owens method. Gig. i Epidemiol.  
No. 11: 10-19, 1928.
- \* Voegtlin, Carl; and Hodge, H. C.  
Pharmacology and toxicology of  
uranium compounds. Chap. 10, pt. 8,  
Methods and procedures. New York,  
McGraw-Hill, 1949. p. 449-506.
- Vokes, C. G.  
Practical filtration in industry.  
Soc. of Engrs., London, J. & Trans.  
39(2): 91-112, 1948.
- Von Brand, E. K.  
Applications of a portable  
continuous smoke recorder. Mech.  
Engin. 72: 479-481, 1950.
- Warren, P. H.; and Read, T. A.  
Methods and apparatus for the  
determination of dust suspended in  
air. Proc. Australasian Inst. Min.  
Met. N.S. No. 47: 297-342, 1922.
- Watson, H. H.  
Dust sampling in a Haematite  
mine with the PRU hand pump. Brit.  
J. Indust. Med. 5: 198-203, 1948.



BIBLIOGRAPHY ON  
METHODS OF SAMPLING AIRBORNE PARTICLES.

IV. IMPINGEMENT & IMPACTION.

- \* Aitken, John.  
On the number of dust particles in the atmosphere. Trans. Roy. Soc. Edinburgh. 35: 1-20, 1888.  
In: Collected Scientific Papers of John Aitken, C. G. Knott, ed. p. 187-206.
- Amelin, A. C.  
Device for the determination of mist and spray in the production of contact sulphuric acid. Zavodskaya Lab. 7: 878-879, 1938. Chem. Abstr. 33: 816.
- \* Anderson, E. L.  
The effect of certain impingement dust-sampling instruments on the dust particles. J. Indust. Hyg. & Toxicol. 21: 39-47, 1939.
- Anderson, F. P.; and Armspach, O. W.  
A new method of making air dust determinations. Trans. Amer. Soc. Heat. & Vent. Engrs. 28: 533, 1932.
- Ary, A. P.  
On the measurement of the dust content of air inside and outside industrial installations. Staub. No. 26: 318-332, 1951. Bull. Hyg. 27: 938, 1952.
- \* Bacteriological procedures in sanitary air analysis. Amer. J. Pub. Health. 37: 1023-1025, 1947.
- Badham, C.; Hayner, H. E. G.; and Broose, H. D.  
Dust sampling in Sydney sandstone industries. Rept. Director-General Public Health, New South Wales, 1927. Studies in Industrial Hygiene. No. 12: 74-101, 1927. Bull. Hyg. 4: 638, 1929.
- \* Barnes, E. C.  
Dust determinations. Amer. J. Pub. Health. 26: 274-280, 1936.
- Baurmash, L.; Curtis, L.; Bryan, F. A.; and Cassem, B.  
Development of continuous jet impaction method for determining airborne contaminants. Contract AT-04-1-GEN-12, Atomic Energy Proj. Univ. of California at Los Angeles, 1949.
- Beadle, D. G.  
An investigation of the performance and limitations of the Konimeter. J. Chem. Met. & Mining Soc. South Africa. 51: 265-283, 1951. Arch. Indust. Hyg. & Occupa. Med. 5: 94, 1952.
- \* Beadle, D. G.  
The shattering of dust particles by the impinger. J. Indust. Hyg. & Toxicol. 21: 109-120, 1941.
- \* Bedford, T.; and Warner, C. G.  
Chronic pulmonary disease in South Wales coalminers. II. Environmental studies. B. Physical studies of the dust hazard and of the thermal environment in certain coalmines. Pt. II-A. Physical study of the dust hazard in certain mines. Collection and evaluation of dust samples. Great Britain Med. Res. Council. Special Rept. Ser. No. 244, 1943. p. 6-18.
- Bernz, N. R.  
Dust counts and their significance. Heating, Piping, Air Cond. 14: 361-363, 603-606, 1942. Chem. Abstr. 36: 6841.

#### IV. Impingement & Impaction.

Bloomfield, J. J.

Dust procedures in air analysis; sampling and analysis of industrial dusts. Amer. Pub. Health Assoc. Year Book, 1935-1936. p. 86-97.

Bloomfield, J. J.

Report of subcommittee on dust procedures in air analysis. Review and discussion of new developments in the sampling and counting of industrial dusts. Amer. Pub. Health Assoc. Year Book, 1940-1941. p. 125-129.

Bloomfield, J. J.; and

Dallavalle, J. M.

Determination and control of industrial dust. U.S. Pub. Health Bull. No. 217, 1935. 167p.

\* Bourdillon, R. B. et al.

Studies in air hygiene. Part II. Methods of sampling air for bacteria. Great Britain Med. Res. Council. Spec. Rept. Ser. No. 262, 1948. p. 12-53.

\* Bourdillon, R. B.; and Lidwell, O.M.

Methods of sampling air for bacteria. 3. The limits of precision in the timing of bacterial air sampling. In: Bourdillon, R.B. et al. Studies in air hygiene, 1948. p. 22-24.

\* Bourdillon, R.B.; and Lidwell, O.M.

Methods of sampling air for bacteria. 6. Losses of particles during collection. In: Bourdillon, R. B. et al. Studies in air hygiene, 1948. p. 27-33.

\* Bourdillon, R.B.; and Lidwell, O.M.

Methods of sampling air for bacteria. 8. The separation of bacterial clusters during sampling. In: Bourdillon, R. B. et al. Studies in air hygiene, 1948. p. 35-37.

\* Bourdillon, R.B.; and Lidwell, O.M.  
Methods of sampling air for bacteria. 7. Collection efficiency of various samplers: theoretical considerations. In: Bourdillon, R. B. et al. Studies in air hygiene, 1948. p. 33-35.

\* Bourdillon, R.B.; and Lidwell, O.M.  
Methods of sampling air for bacteria. 12. The merits and faults of slit samplers when compared with other methods of air sampling. In: Bourdillon, R. B. et al. Studies in air hygiene, 1948. p. 50-53.

\* Bourdillon, R.B.; and Lidwell, O.M.; and Raymond, W. F.  
Methods of sampling air for bacteria. 10. The effect of culture media and conditions of incubation. In: Bourdillon, R.B. et al. Studies in air hygiene, 1948. p. 47-78.

\* Bourdillon, R. B.; Lidwell, O. M.; and Schuster, E.  
Methods of sampling air for bacteria. 1. An improved slit sampler with accurate timing. In: Bourdillon, R. B. et al. Studies in air hygiene, 1948. p. 12-18.

\* Bourdillon, R. B.; Lidwell, O. M.; and Thomas, J. C.  
Methods of sampling air for bacteria. 2. A large slit sampler for air containing few bacteria. In: Bourdillon, R. B. et al. Studies in air hygiene, 1948. p. 19-21.

Bourdillon, R. B.; Lidwell, O. M.; and Thomas, J. C.  
Slit sampler for collecting and counting air-borne bacteria. J. Hyg. 41: 197-224, 1941.

#### IV. Impingement & Impaction.

- Bourne, H. G.  
Construction of an automatic air sampling apparatus. Heating & Vent. 49: 65-68, 1952.
- Bourne, H. G.; and Schafer, R. D.  
Fuel pump for air sampling. Heating & Vent. 48: 74, 1951.
- Boyd, James.  
The estimation of dust in mine air. Third Empire Mining Met. Congr., South Africa, 1930. 23p. Chem. Abstr. 24: 2691.
- Braham, R. R.; Seely, B. K.; and Grozier, W. D.  
A technique for tagging and tracing air parcels. Trans. Amer. Geophysical Union. 33: 825-833, 1952.
- Bricard, M. J.  
Propagation of visible and infrared radiations through fog. Roy. Meteorological Soc., Centenary Proc., 1950. p. 36-42.
- Brown, C. E.  
Filter-paper method for obtaining dust-concentration results comparable to impinger results. U.S. Bur. Mines Rept. Invest. No. 3788, 1944. 20p. Chem. Abstr. 39: 10898.
- Brown, C. E.  
Midget microprojector for dust determination. U.S. Bur. Mines Rept. Invest. No. 3780, 1944. 14p.
- Brown, C. E.; Baum, L. A.; Yant, W. P. and Schrenk, H. H.  
Microprojection method for counting impinger dust samples. U.S. Bur. Mines Rept. Invest. No. 3373, 1938. 9p.
- Brown, C. E.; Beatty, R. L.; and Kirby, T. B.  
Dust-counting cells. U.S. Bur. Mines Informa. Circ. No. 7331, 1945. 9p. Chem. Abstr. 39: 51339.
- \* Brown, C. E.; Fisher, Morris; and Boyer, F. F.  
Size of smallest particles determined in impinger dust counting methods. U.S. Bur. Mines Rept. of Invest. No. 4802, 1951. 19p.
- \* Brown, C. E.; and Schrenk, H.  
Relation between and precision of dust counts, (light- and dark-field) from simultaneous impinger, midget impinger, electric precipitator and filter-paper samples. U.S. Bur. Mines Rept. of Invest. No. 4568, 1949. 35p.
- \* Brown, C. E.; and Schrenk, H.  
Standard methods for measuring the extent of atmospheric pollution. U.S. Bur. Mines Informa. Circ., No. 7210, 1942. 19p.
- \* Brown, C. E.; and Schrenk, H. H.  
A technique for use of the impinger method. U.S. Bur. Mines Informa. Circ. No. 7026, 1938. 20p.
- Brown, C. E.; and Yant, W. P.  
Micro-projector for determining particle size distribution and number concentration of atmospheric dust. U.S. Bur. Mines Rept. Invest. No. 3289, 1935. 8p.
- Brun, E.; Damon, L.; and Vasseur, M.  
Captation mécanique de corpuscles en suspension dans l'air. La Recherche Aéronautique. No. 1: 15-19, 1948.
- \* Brunetti, Clelio; Magill, P. L.; and Sawyer, F. G.  
New developments in instrumentation for air pollution studies. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 643-655.

#### IV. Impingement & Impaction.

- Bryan, A. M.; and Smellie, J.  
The estimation of dust in mine atmosphere. J. Roy. Tech. Coll. 3: 671-681, 1936.
- Bubar, H. H.  
Relative merits of large and small sampling nozzles for dust determinations. Combustion. 13(12): 39-42, 1942.
- Cadden, J. F.; and Rothman, E. T.  
Photometric method for making dust determinations. Bur. Indust. Hyg., State Health Dept., Charleston, West Va., 1939.  
Chem. Abstr. 36: 15652.
- \* Cadle, R. D.  
Determination of the composition of airborne particulate material. Anal. Chem. 23: 196-198, 1951.
- \* Cadle, R. D.; Rubin, Sylvan; Glassbrook, C. I.; and Magill, P. L.  
Identification of particles in Los Angeles smog by optical and electron microscopy. Arch. Indust. Hyg. & Occupa. Med. 2: 698-715, 1950.
- \* Chaney, A. L.  
Industrial dusts and fumes in the Los Angeles area. Indust. & Engin. Chem. 41: 2486-2493, 1949.
- \* Charmbury, H. B.  
Use and limitations of the midjet impinger for dust evaluations. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 184-192.
- \* Chen, W. L.; and Charmbury, H. B.  
Location of dust producing areas; use and limitations of the midjet impinger. Indust. & Engin. Chem. 41: 2400-2402, 1949.
- Chubb, C. S.  
Limitations to the use of the Konimeter. 8th Rept., Monmouthshire and South Wales Coal Owner's Association. Coal Dust Committee, 1943. 27p. Bull. Hyg. 18: 485, 1943.
- \* Crozier, W. D.  
Airborne particle study. New Mexico School of Mines, Res. & Develop. Div. Contract N70NR-405, Task 1, Proj. Designation No. NR-082-013. Reports.
- \* Crozier, W. D.; and Seely, B. K.  
Some techniques for sampling and identifying particulate matter in the air. Proc. 1st Natl. Air Pollution Symposium, 1949. p. 45-49.
- \* Dalla Valle, J. M.  
Note on comparative tests made with the Hatch and Greenburg-Smith impingers. Pub. Health Repts. 52: 1114-1118, 1937.
- \* Dalla Valle, J. M.  
The significance of dust counts. Pub. Health Repts. 54: 1095-1104, 1939.
- \* Dalla Valle, J. M.; and Hollaender, Alexander.  
The effectiveness of certain types of commercial air filters against bacteria. Pub. Health Repts. 54: 695-699, 1939.
- Davidson, W. F.  
A study of atmospheric pollution. Monthly Weather Review. 70: 225-234, 1942.
- Davidson, W. F.; and Master, Warren.  
Automatic dust sampling and analyzing instruments for atmospheric pollution surveys. Monthly Weather Rev. 69: 257-260, 1941.

#### IV. Impingement & Impaction.

- Davies, C. N.; and Aylward, Mary.  
The trajectories of heavy, solid particles in a two dimensional jet of ideal fluid impinging normally upon a plate. Proc. Phys. Soc. London. 64B: 889-911, 1951.
- \* Davies, C. N.; Aylward, Mary; and Leacey, Dorothy.  
Impingement of dust from air jets. Arch. Indust. Hyg. Occupa. Med. 4: 354-397, 1951.
- Davis, D. H.; and Gardner, G. R.  
An investigation of dust suppression in the Pittsburgh seam. Trans. Amer. Inst. Min. Engrs. Col. Tech. 149: 193-206, 1942. Bull. Hyg. 18: 735, 1943.
- Dawe, A.; and Potter, N. M.  
Sampling of coal in the laboratory with the cascade sampler. Fuel. 15: 128-136, 1936. Chem. Abstr. 30: 69215.
- Dessens, Henri.  
The use of spider's threads in the study of condensation nuclei. Roy. Meteor. Soc. Quart. J. 75: 23-26, 1949.
- \* Drinker, Philip; and Hatch, Theodore.  
Industrial dust; hygienic significance, measurement and control. New York, McGraw-Hill, 1936.
- \* Druett, H. A.  
Determination of variation of composition of airborne crystalline materials with particle size. Nature. 158: 946, 1946.
- \* Du Buy, H. G.; and Crisp, L. R.  
Sieve device for sampling air-borne microorganisms. Pub. Health Repts. 59: 829-832, 1944.
- \* Du Buy, H. G.; and Hollaender, Alexander.  
Symposium on air-borne infection; sampling devices. Amer. J. Med. Sci. 209: 172-177, 1945.
- \* Du Buy, H. G.; Hollaender, Alexander; and Lackey, Mary D.  
A comparative study of sampling devices for air-borne microorganisms. Pub. Health Repts. Suppl. No. 184, 1945. 40p.
- Duval, René.  
Note on sampling. Ann. Mines. 138(2): 3-51, 1949.
- Ehrhardt, W.  
On the techniques of evaluating konimeter spots. Staub. No. 26: 333-341, 1951. Bull. Hyg. 27: 939, 1952.
- Emery, A. H.  
Instructions for sampling atmospheric dust by the impinger method. Bur. Mines Rept. Invest. No. 6048, 1927. 9p. Chem. Abstr. 22: 1275.
- Faber, O. M.  
Gravimetric, tyndallmetric and konimetric measurement of dust. Staub. 7: 377-408, 1937.
- Faber, O. M.  
Methods of measurement for the examination of small samples of dust. Staub. No. 8: 4-46, 1938. Chem. Abstr. 34: 77817.
- \* Fahnoe, Frederick; Lindroos, A. E.; and Abelson, R. J.  
Aerosol build-up techniques. Indust. & Engin. Chem. 43: 1336-46, 1951.
- Fehnel, J. W.  
Methods of determining dust concentrations. Safety Engin. 47: 217-220, 1934.

#### IV. Impingement & Impaction.

- \* Feiner, Benjamin.  
Industrial air analysis. II.  
Sampling methods. Modern Sanit.  
2(1): 19-21, 56, 1950.
- \* Ferry, R. M.; Farr, L. E.; and  
Hartman, Mary G.  
The preparation and measurement  
of the concentration of dilute  
bacterial aerosols. Chem. Rev.  
44: 389-417, 1949.
- \* Fickeln, J. B.; and Golden, L. L.  
The behavior of certain dusts  
under mechanical impingement.  
Science. 85: 587-588, 1937.
- Finn, S. R.; and Powell, E. O.  
The chemical and physical  
investigation of germicidal aerosols.  
II. The aerosol centrifuge.  
J. Hyg. 42: 354-364, 1942.
- Fitton, A.; and Sayles, C. P.  
Collection of a representative  
flue-dust sample. Engineering.  
173: 229-230; 261-263, 1952.
- \* Forbes, J. J.; Davenport, Sara J.;  
and Morgis, Genevieve G.  
Review of literature on dusts.  
p. 127-148, Dust sampling methods.  
U.S. Bur. Mines Bull. No. 478, 1950.  
333p.
- Franks, W. H.; and Treadsidder, L. O.  
Photometric estimation of  
konimeter dust samples. Mining  
Mag. 51: 265-271, 1934.  
Chem. Abstr. 29: 426<sup>6</sup>.
- \* Gibbs, W. E.  
Clouds and smokes; the properties  
of disperse systems in gases and  
their practical applications.  
London, J. & A. Churchill, 1924.
- \* Goldberg, L. J.  
Studies on the experimental epi-  
demiology of respiratory infections.  
IV. A particle size analyzer applied  
to the measurement of viable air-  
borne bacteria. J. Infec. Dis.  
87: 133-141, 1950.
- \* Goldberg, L. J.; and  
Schechmeister, I. L.  
Studies on the experimental epi-  
demiology of respiratory infections.  
V. Evaluation of factors related to  
slit sampling of air-borne bacteria.  
J. Infec. Dis. 88: 243-247, 1951.
- Goldman, F. H.  
Sampling and analysis of air  
contaminants. Methods in the war  
industries. Indust. Med.  
13: 100-103, 1944.
- Goodale, T. C.; Carder, B. M.;  
and Evans, E. O.  
Dust particles in high velocity  
air streams; representative  
sampling. Amer. Indust. Hyg.  
Assoc. Quart. 13: 226-231, 1952.
- Goodeve, C. F.  
The removal of mist by centri-  
fugal methods. Trans. Faraday Soc.  
32: 1218-1223, 1936.  
Chem. Abstr. 30: 724<sup>4</sup>7.
- Green, H. L.  
A pplication of the Aitken effect  
to the study of aerosols. Phil.  
Mag. 4: 1046-1050, 1927.  
Chem. Abstr. 22: 727<sup>5</sup>.
- Green, H. L.  
Recent developments in methods  
of sampling dusts. Inst. Min. &  
Met. Bull. 362, 1934. 21p.  
Chem. Abstr. 29: 6105<sup>7</sup>.
- Green, H. L.; and Watson, H. H.  
Physical methods for the estima-  
tion of dust hazard in industry.  
Great Britain Med. Rec. Counc.  
Spec. Rept. Ser. No. 199, 1935. 56p.  
Bull. Hyg. 10: 291-292, 1935.
- \* Greenburg, Leonard.  
The Greenburg-Smith impinger  
sampling apparatus for dusts,  
fumes, smoke and gases.  
Amer. J. Pub. Health. 22: 1077-82,  
1932.

#### IV. Impingement & Impaction.

- \* Greenburg, Leonard.  
The industrial dust problem.  
II. Review of the methods used  
for sampling aerial dust. Pub.  
Health Repts. 40: 765-786, 1925.
- \* Greenburg, Leonard.  
Industrial dust problem.  
III. Comparative field studies of  
the Palmer apparatus, the konimeter  
and the impinger methods for  
sampling aerial dust. Pub. Health  
Repts. 40: 1591-1603, 1925.
- Greenburg, Leonard and  
Bloomfield, J. J.  
The impinger dust sampling  
apparatus as used by the United  
States Public Health Service.  
Pub. Health Repts. 47: 654-675,  
1932.
- Greenburg, Leonard; and Smith, G. W.  
A new instrument for sampling  
aerial dust. U.S. Bur. Mines  
Rept. Invest. No. 2392, 1922. 3p.
- Griffiths, J. H.; and Jones, T. D.  
Determination of dust concen-  
trations in mine atmospheres.  
Trans. Inst. Mining Engin.  
99: 150-180, 1940.
- \* Gurney, S. W.; Williams, C. R.;  
and Meigs, R. R.  
Investigation of the character-  
istics of the Bausch and Lomb dust  
counter. J. Indust. Hyg. &  
Toxicol. 20: 24-35, 1938.
- Hamilton, R. J.; Wainwright, T.;  
and Walton, W. H.  
The effect of adhesive film thick-  
ness on the sampling efficiency of  
the konimeter. Brit. J. Indust.  
Med. 8: 14-21, 1951.
- Hamly, D. H.; and Pullen, P. F.  
Dust quantitation by micropro-  
jection and comparison counting.  
Trans. Can. Inst. Mining Met.  
45: 140-153, 1942.  
Chem. Abstr. 36: 6841g.
- Hasselt, Institut d'Hygiene des  
Mines.  
Comparative results of simul-  
taneous sampling by means of the  
thermal precipitator, midget impinger  
and soxhlet thimble. Gen. 179, 1952.  
17p. Bull. Hyg. 27: 938, 1952.
- Hasselt, Institut d'Hygiene des  
Mines.  
Konimetry. Construction and use  
of a filtering apparatus for the  
determination of atmospheric dust  
content. Communication No. 22.  
Gen. 35, 1947. 8p.  
Bull. Hyg. 22: 703, 1947.
- Hasselt, Institut d'Hygiene des  
Mines.  
Study of the midget impinger.  
Communication No. 67. Gen. 121,  
1949. 22p.  
Bull. Hyg. 26: 781, 1951.
- Hatch, Theodore; and Pool, C. L.  
Quantitation of impinger dust  
samples by dark field microscopy.  
J. Indust. Hyg. 16: 177-191, 1934.  
Bull. Hyg. 9: 596, 1934.
- Hatch, Theodore; and Thompson, E.W.  
Rapid method of dust sampling  
and approximate quantitation for  
routine plant operation. J.  
Indust. Hyg. & Toxicol. 16: 92-99,  
1934. Bull. Hyg. 9: 449, 1934.
- Hatch, Theodore; Warren, Henry;  
and Drinker, Philip.  
Modified form of the Greenburg-  
Smith impinger for field use, with  
a study of its operating characteris-  
tics. J. Indust. Hyg. & Toxicol.  
14: 301-311, 1932.  
Bull. Hyg. 8: 106, 1933.
- Hay, P. S.  
The prevention of silicosis.  
Review of practical methods.  
Iron & Coal trades Rev. 127: 713,  
1933.

#### IV. Impingement & Impaction.

- Hazard, W. G.  
An atmospheric dust recorder.  
J. Franklin Inst. 217: 571, 1934.
- Hazard, W. G.; and Drinker, Philip.  
An atmospheric dust recorder.  
J. Indust. Hyg. & Toxicol.  
16: 192-196, 1934.  
Bull. Hyg. 9: 596, 1934.
- Hesse, W.  
Quantitative studies on micro-organisms in air. Mitt. a. d. K. Gesundheitsamt. 2: 181-207, 1884.
- Heymann, B.  
Methods of determining the amount of dust in air. Zent. f. Hyg.  
24: 1-38, 1931.
- Hill, M. V.  
Quantitative determination of air dust. Heat. & Vent. Mag.  
14(6): 23-33, 1917.
- \* Hollaender, Alexander and  
Dalla Valle, J. M.  
Simple device for sampling air-borne bacteria. Pub. Health Repts.  
54: 574-577, 1939.
- Holt, P. F.  
The study of dusts in industrial atmospheres. 2. The konimeter and jet sampling instruments.  
Metallurgia. 43: 203-204, 1951.
- Holt, P. F.  
The study of dusts in industrial atmospheres. 3. The impinger and cascade impactor. Metallurgia.  
43: 258-259, 1951.  
Chem. Abstr. 45: 63201.
- Houghton, H. G.; and Radford, W.H.  
On the measurement of drop size and liquid water content in fogs and clouds. I. Microscopic measurement of the size of natural fog particles. Papers in Physical Oceanography & Meteorology, Mass. Inst. Tech. 6(4): 1-18, 1938.
- Hurtig, H.; and Perry, A. S.  
Slide coatings for aerosol droplet collection and preservation.  
J. Econ. Entom. 43: 952-954, 1950.  
Chem. Abstr. 45: 5864a.
- Innes, John.  
The estimation of injurious dust in mine air by the Kotze konimeter. J. Chem. Med. Soc. South Africa. 18: 199-209, 211-216, 1918.
- Innes, J.  
The investigation of injurious dust in mine air by the Kotze Konimeter. J. Chem. Metal. & Min. Soc. South Africa. 23: 77, 1922.
- \* Irwin, J. O.; Armitage, P.; and  
Davies, C. N.  
Overlapping of dust particles on a sampling plate. Nature.  
163: 809, 1949.
- Jaworski, H. E.; and Lavetter, V.E.  
Detroit engineers design and build battery operated midjet impinger apparatus. Indust. Hyg. Newsletter.  
9(7): 10, 1949.
- Johnson, H. F.  
High velocity impactor for sampling aerosols. Memorandum Rept., Urbana, Ill, Univ. of Illinois Press, March 15, 1949.
- Kagen, M.; and Broumstein, W.  
Rational method for calculating records obtained by means of Owen's jet dust counting apparatus.  
J. Indust. Hyg. 13: 10, 1931.
- Katz, S. H.; Smith, G. W.; and  
Meyers, W. M.  
Determinations of air dustiness with the sugar tube, Palmer apparatus and impinger, compared with determinations with the konimeter.  
J. Indust. Hyg. & Toxicol.  
8: 300-306, 1926.



#### IV. Impingement & Impaction.

- Katz, S. H.; Smith, G. W.;  
Meyers, W. M.; Trostel, L. J.;  
Ingels, M.; and Greenburg, L.  
Comparative tests of instruments  
for determining atmospheric dust.  
U.S. Pub. Health Serv. Bull. 144,  
1927.
- \* Kay, Kingsley.  
Analytical methods used in air  
pollution study. Indust. Engin.  
Chem. 44: 1383-1388, 1952.
- \* Keenan, R. G.; and Fairhall, L. T.  
Absolute efficiency of the im-  
pinger and of the electrostatic  
precipitator in the sampling of  
air containing metallic lead fume.  
J. Indust. Hyg. & Toxicol.  
26: 241-249, 1944.
- \* Kelly, C. D.  
Aerobiological sampling methods  
from aircraft. Canad. J. Pub.  
Health. 42: 71, 1951.
- \* Kelly, C. D.; and Pady, S. M.  
Microbiological studies of air  
over some non-arctic regions of  
Canada. Canad. J. Botany.  
31: 90-106, 1953.
- Kimball, H. H.; and Hand, I. F.  
Investigation of the dust content  
of the atmosphere. Monthly Weather  
Rev. 52: 133-139, 1924.  
53: 243-246, 1925.  
59: 349-352, 1931.
- Koch, R.  
Research on the pathogenic  
organisms. Mitt. a. d. K.  
Gesundheitsamt. 1: 32, 1881.
- Kronenberg, M. H.; Setterlind, A. N.;  
and McClure, C. H.  
Investigation of factors influ-  
encing dust determination made by  
the impinger method. J. Indust.  
Hyg. & Toxicol. 19: 198-203, 1937.  
Bull. Hyg. 12: 617, 1937.
- Kunkel, H. E.; and McMahon, H. E.  
Collection and quantitative  
measurements of dusts and fumes in  
city atmosphere and from individual  
sources. Proc. Air Pollution Smoke  
Prevent. Assoc. Amer., 1950.  
p. 42-51. Chem. Abstr. 45: 6328e.
- Lambrechts, J. d. V.  
A critical review of dust-sampling  
methods employed in Witwatersrand  
gold mines. J. Chem. Met. Mining  
Soc. Africa. 41: 209-240, 1940.  
41: 363-369, 1941.  
Bull. Hyg. 16: 439-440, 1941.
- \* La Mer, V. K.  
The preparation, collection and  
measurement of aerosols. Proc.  
1st. Natl. Air Pollution Symposium,  
1949. p. 5-13, 1949.
- \* La Mer, V. K.  
The preparation, collection and  
measurement of aerosols. Proc.  
U.S. Tech. Conf. on Air Pollution,  
1952. p. 607-616.
- \* Landahl, H. D.; and Herrmann, R. G.  
Sampling of liquid aerosols by  
wires, cylinders and slides, and  
the efficiency of impaction of the  
droplets. J. Coll. Sci. 4: 103-136,  
1949.
- \* Laskin, Sidney.  
The modified cascade impactor.  
Proc. U.S. Tech. Conf. on Air  
Pollution, 1952. p. 656-671.
- Laskin, Sidney.  
The modified cascade impactor.  
UR-129. Atomic Energy project,  
Univ. Rochester. Contract No.  
W-7401-eng-49. 1950, 31p.

#### IV. Impingement & Impaction.

- Laskin, Sidney; Wilson, R. H.;  
Lauterbach, K. E.; Leach, L. J.;  
and Falconer, D. W.  
Production design of the modified  
cascade impactor. 16p. UR-130.  
Atomic Energy project, Univ. Roches-  
ter. Contract W-7401-eng-49. 1950.
- Laurell, G.; Lofstrom, G.;  
Henning, M. J.; and  
Ouchterlony, O.  
Air borne infections. II. A  
report on the methods. Acta  
Medica Scand. 134(3): 189-204,  
1949.
- \* Leif, W. R.; and Krueger, A. P.  
Studies on the experimental  
epidemiology of respiratory infec-  
tions. I. An apparatus for the  
quantitative study of air-borne  
respiratory pathogens. J. Infec.  
Dis. 87: 103-116, 1950.
- Littlefield, J. B.  
Practical discussion of the  
midget impinger for dust sampling.  
Pennsylvania Dept. Labor Ind.,  
Safe Practice Bull. No. 17, 1939.  
11p. Chem. Abstr. 33: 9479<sup>6</sup>.
- Littlefield, J. B. et al.  
Efficiency of impingers for  
collecting lead dusts and fumes.  
U.S. Bur. Mines, Rept. Invest.  
No. 3401, 1938. 9p.
- Littlefield, J. B.; Brown, C. E.;  
and Schrenk, H. H.  
Technic for routine use of the  
konimeter. U.S. Bur. Mines Circ.  
No. 6993, 1938. 6p.
- \* Littlefield, J. B.; Feicht, Florence;  
and Schrenk, H. H.  
Bureau of Mines midget impinger  
for dust sampling. U.S. Bur. Mines  
Rept. Invest. No. 3360, 1937. 4p.
- Löbner, A.  
The Zeiss konimeter and its  
applications. Phytopath. Zeitschr.  
8: 633-636, 1936.  
Chem. Abstr. 30: 2426<sup>9</sup>.
- \* Luckiesh, M.; Holladay, L. L.;  
and Taylor, A. H.  
Sampling air for bacterial content;  
new mechanical designs and applica-  
tions of electrostatic fields.  
Gen. Elec. Rev. 49(3): 8-17, 1946.
- \* Luckiesh, M.; and Taylor, A. H.  
Determining and reducing the  
concentration of air-borne micro-  
organisms. Heating-Piping.  
19(1): 113-117, 1947.
- \* Luckiesh, M.; Taylor, A. H.; and  
Holladay, L. L.  
Sampling devices for air-borne  
bacteria. J. Bact. 52: 55-65,  
1946.
- \* Luckiesh, M.; Taylor, A. H.; and  
Knowles, Thomas.  
Sampling devices for determining  
the bacterial content of air.  
Rev. Sci. Instr. 20: 73-77, 1949.
- \* McCabe, L. C.; Mader, P. P.;  
and McMahon, H. E.  
Industrial dusts and fumes in  
the Los Angeles area. Indust.  
Engin. Chem. 41: 2486-2493, 1949.
- \* McConnell, W. J.; and Thomas, B.G.H.  
Relative values of methods of  
enumerating bacteria in air.  
Pub. Health Repts. 40: 2167-2178,  
1925.
- \* McCormick, W. E.  
The preparation of slides for  
measurement of dust particle size.  
Pub. Health Repts. 61: 129-132,  
1946.

#### IV. Impingement & Impaction.

- \* Mac Donald, K.  
The efficiency of the Wells  
air centrifuge as determined by  
an air washing technique. Amer.  
J. Hyg. 31B: 85-87, 1940.
- Magill, P. L.  
Determination procedures.  
Amer. Indust. Hyg. Assoc. Quart.  
11: 55-63, 1950.  
Chem. Abstr. 45: 2612f.
- \* Magill, P. L.  
Sampling procedures and  
measuring equipment. Manufacturing  
Chemists Association Air Pollution  
Abatement Manual, 1952. Chap. 6.  
39p.
- \* Magill, P. L.  
Techniques employed in the  
analysis of Los Angeles smog.  
Proc. 1st Natl. Air Pollution  
Symposium, 1949. p. 61-68.
- Mavrogordato, A.  
The value of the konimeter -  
being an investigation into the  
methods and results of dust sampling  
as at present practiced in the mines  
of Witwatersrand. South Africa  
Inst. Med. Res. Pub. No. 17, 1923.  
71p.
- \* May, J. W.  
Viscous impingement filters.  
Proc. U.S. Tech. Conf. on Air  
Pollution, 1952. p. 273-279.
- May, K. R.  
Apparatus for sampling particu-  
late clouds. U.S. Pat. 2, 538,116.
- \* May, K. R.  
The cascade impactor; an instru-  
ment for sampling coarse aerosols.  
J. Sci. Instr. 22: 187-195, 1945.
- May, K. R.  
Instructions for the use of the  
cascade impactor. PTN-1600,  
April 1, 1944. 19p. Nuclear Sci.  
Abstr. v2, #1574.
- \* May, K. R.  
The measurement of airborne  
droplets by the magnesium oxide  
method. J. Sci. Instr.  
27: 128-130, 1950.
- \* Mazur, J.  
On the sampling of water droplets  
in natural clouds and in radiation  
fogs. Proc. Phys. Soc.  
65B: 457-458, 1952.
- Meier, F. G.; and Lindbergh, C. A.  
Collecting microorganisms from  
the arctic atmosphere. Sci.  
Monthly. 40: 5-20, 1935.
- \* Miles, A. A.  
Methods of sampling air for  
bacteria. 9. The "cascade" method  
of detection and separation of air-  
borne clusters of bacteria. In:  
Bourdillon, R. B. et al. Studies  
in air hygiene, 1948. p. 38-46.
- Monmouthshire & South Wales Coal  
Owner's Assoc.  
Experience gained in sampling.  
7th. Rept., Monmouthshire & South  
Wales Coal Owner's Assoc. Coal dust  
research committee, 1942. 87p.  
Bull. Hyg. 18: 486, 1943.
- \* Montroll, E. W.; and Newell, G. F.  
Unsteady-state performance of  
cascades. I. J. Appl. Physics.  
23: 184-194, 1952.
- \* Munger, H. P.  
Air pollution at low altitudes.  
Techniques for study. Chem. Engin.  
Prog. 47: 436-439, 1951.
- \* Munger, H. P.  
The spectrum of particle size  
and its relation to air pollution.  
Proc. U.S. Tech. Conf. on Air  
Pollution, 1952. p. 159-166.
- Nelson, A.  
Dust control in hard headings.  
Colliery Guardian. 165: 729-733,  
1942. Bull. Hyg. 18: 734, 1943.

#### IV. Impingement & Impaction.

- Nielson, R. A.  
A study of atmospheric dust using a continuous recording jet counter. *Terrestrial Magnetism & Atmospheric Electricity*. p. 281-292, 1934.
- Norman, G. C. H.  
Methods of sampling and dust determination in the mines of Ontario. *Amer. Inst. Mining Met. Engrs. Tech. Pub. No. 857*, 1937. 20p. *Chem. Abstr.* 32: 395.
- \* Ohlheiser, H. R.; and Lawrence, L.B.  
Dust counting - a simplified technic. *J. Indust. Hyg. & Toxicol.* 22: 472-476, 1940.
- Owens, J. S.  
Atmospheric dust. *J. Soc. Chem. Indust.* 41: 438-443, 1922. *Chem. Abstr.* 17: 321.
- Owens, J. S.  
Automatic measurement of atmospheric pollution. *Chem. & Indust.* 43: 866-871, 1924. *Chem. Abstr.* 18: 3442.
- Owens, J. S.  
Jet dust counting apparatus. 4(12): 522-534, 1923. *J. Indust. Hyg. & Toxicol.*
- Owens, J. S.  
Suspended impurity in the air. *Proc. Roy. Soc. London Ser. A.* 101: 18-37, 1922.
- \* Pady, S. M. et al.  
Arctic aerobiology; presence of spores of cereal pathogens on slides exposed from airplanes in 1947. *Phytopathology*. 40: 632-641, 1950.
- \* Pady, S. M.; and Kelly, C. D.  
Studies on microorganisms in arctic air during 1949 and 1950. *Canad. J. Botany*. 31: 107-122, 1953.
- \* Pady, S. M.; and Kelly, C. D.  
Use of silicones in aerobiology. *Science*. 110: 187, 1949.
- Patterson, H. S.; and Whytlaw-Gray, R.  
On the densities of particles in smokes. *Proc. Roy. Soc.* A113: 302-311, 1926.
- \* Perkins, W. A.; Leighton, P. A.; Grinnet, S. W.; and Webster, F.X.  
A fluorescent atmospheric tracer technique for mesometeorological research. *Proc. 2d Natl. Air Pollution Symposium*, 1952. p. 42-46.
- \* Phelps, E. B.  
The state of suspension of bacteria in the air as measured by settling rates. *AAAS Aerobiology*, 1942. p. 133-137.
- \* Phelps, E. B.; and Buchbinder, Leon.  
Studies on microorganisms in simulated room environments. II. A study of the performance of the Wells air centrifuge and of the settling rates of bacteria through the air. *J. Bact.* 42: 321-344, 1944.
- Pickard, R. H.  
~~Settling rates~~ of dust in the air of cotton-card rooms. *J. Textile Indust.* 21: 595-604, 1930. *Chem. Abstr.* 25: 4132.
- \* Polunin, Nicholas; and Kelly, C.D.  
Arctic aerobiology; fungi and bacteria caught in the air during flights over the geographical North Pole. *Nature*. 170: 314-16, 1952.
- Proctor, B. E.  
The microbiology of the upper air. I. *Proc. Amer. Acad. Arts. & Sci.* 69(8): 315-340, 1934.

#### IV. Impingement & Impaction.

- \* Proctor, B. E.; and Parker, B. W.  
Microbiology of upper air;  
improved apparatus and technic for  
investigations. J. Bact.  
36: 175-185, 1938.
- Ranz, W. E.  
Impaction of aerosol particles  
on cylindrical and spherical  
collectors. Tech. Rpt. No. 3  
(80-1004), March 31, 1951. 92p.
- \* Ranz, W. E.; and Wong, J. B.  
Impaction of dust and smoke  
particles on surface and body  
collectors. Indust. Engin. Chem.  
44: 1371-1381, 1952.
- \* Ranz, W. E.; and Wong, J. B.  
Jet impactors for determining  
the particle size distributions  
of aerosols. Arch. Indust. Hyg.  
Occup. Med. 5: 464-477, 1952.
- Rees, J. P.; and Rabson, S. R.  
An improved type konimeter.  
South African Mining Engin. J.  
59II: 561, 1949.
- Rees, J. P.; and Rabson, S. R.  
An improved type of konimeter.  
Bull. Inst. Mining Met.  
No. 508: 21-24, 1949.
- Robertson, A. G.  
Apparatus for studying atmos-  
phere. Canad. Pat. 398, 410.  
Aug. 5, 1941.  
Chem. Abstr. 35: 6491<sup>1</sup>.
- \* Robertson, A. G.; Mulder, J. G.;  
and Van Saun, F. G.  
Measuring smokes and rating  
efficiencies of industrial air  
filter. Indust. Engin. Chem. Anal.  
Ed. 13: 331-334, 1941.
- \* Rogers, L. A.; and Meier, F. C.  
An apparatus for collecting  
bacteria in the stratosphere.  
J. Bact. 31: 27, 1936.
- \* Rosebury, Theodore.  
Experimental airborne infection.  
Chap. 12. Cloud sampling devices.  
Baltimore, Williams & Wilkins, 1948.  
p. 108-116.
- \* Ross, A. A.; and Shaw, N. H.  
Dust hazards in Australian  
foundries. Tech. Rpt. No. 1,  
Indust. Welfare Div., Dept. of  
Labour & National Service, Australia,  
1943. 45p.
- Rowley, F. B.; and Jordan, R. C.  
Comparative performance of four  
different kinds of dust counter.  
Technical Paper No. 35. Univ. of  
Minnesota Mining & Engineering  
Exper. Sta, 1942
- Rowley, F. B.; and Jordan, R. C.  
Design and performance character-  
istics of a new type impingement  
dust counter. Technical Paper No. 45.  
Univ. Minnesota Mining & Engineering  
Exper. Sta., 1943. 24p.  
Chem. Abstr. 38: 4840<sup>4</sup>.
- Rowley, F. B.; and Jordan, R. C.  
Minnesota dust counter; compara-  
tive performance of four different  
types of dust counters. Engineering.  
154: 401-404, 1942.
- \* Rowley, F. B.; and Jordan, R. C.  
New type of adhesive impingement  
dust counter. J. Indust. Hyg. &  
Toxicol. 25: 293-302, 1943.
- Rubin, Sylvan.  
Liquid particles in atmospheric  
haze. J. Atmospheric & Terrestrial  
Physics. 2(2): 130-140, 1952.
- \* Sawyer, K. F.; and Walton, W. H.  
The confuge - a size separating  
sampling device for airborne parti-  
cles. J. Sci. Instr.  
27: 272-276, 1950.

#### IV. Impingement & Impaction.

- Schaefer, V. J.  
The preparation and use of water sensitive coatings for sampling cloud particles. Gen. Electric Res. Lab., April, 1946. 17p. ATSC Contract W-33-038-AC-9151.
- Schrenk, H. H.  
Bureau of Mines midjet-impinger dust-sampling apparatus. Mining Congr. J. 24: 23-25, 1938. Chem. Abstr. 32: 7310.
- \* Schrenk, H. H.  
Rapid methods for the estimation of air dustiness. Amer. J. Pub. Health. 30: 1183-1189, 1940.
- \* Schrenk, H. H.; and Feicht, F. L.  
Bureau of Mines midjet impinger. U.S. Bur. Mines Informa. Circ. No. 7076, 1939. 7p.
- \* Schuster, E.  
Methods of sampling air for bacteria. 4. A slit sampler for prolonged reading. In: Bourdillon, R. B. et al. Studies in air hygiene, 1948. p. 24-26.
- \* Schuster, E.  
Methods of sampling air for bacteria. 5. A slit sampler for microscope slides. In: Bourdillon, R. B. et al. Studies in air hygiene, 1948. p. 26-27.
- Selective dust sampling; modified Zeiss Konimeter. Iron & Coal Trades Rev. 128: 840, 1934.
- Setterlind, A. N.  
An appraisal of present-day field instruments. Amer. Indust. Hyg. Assoc. Quart. 9: 35-45, 1948. Chem. Abstr. 44: 1285c.
- Shafir, A. T.  
New apparatus for bacteriological investigation of air. Sovet. Vrachebnyi Zhur. 45: 129-134, 1941.
- Shaw, N.; and Owens, J. S.  
The smoke problem of great cities. Constable & Co., Ltd., London. 1928.
- \* Silverman, Leslie.  
Characteristics of filter beds for aerosols. Proc. U.S. Tech. Conf. Air Pollution, 1952. p. 289-301.
- \* Silverman, Leslie.  
Industrial air sampling and analysis. Indust. Hyg. Founda., Chem. & Toxicol. Ser. Bull. No. 1, 1947. 72p. Chem. Abstr. 42: 3286g.
- \* Silverman, Leslie.  
Sampling of industrial stacks and effluents for atmospheric pollution control. Proc. 1st. Natl. Air Pollution Symposium, 1949. p. 55-60.
- \* Silverman, Leslie; and Franklin, W.  
Shattering of particles by the impinger. J. Indust. Hyg. & Toxicol. 24: 80-82, 1942.
- \* Silverman, Leslie; and Williams, C. R.  
Increasing the portability of the Bausch & Lomb dust counter. J. Indust. Hyg. & Toxicol. 21: 67-71, 1937.
- \* Sinclair, David.  
Measurement of particle size and size distribution. U.S. Atomic Energy Commission, Handbook on Aerosols, 1950. p. 97-116.
- Smith, Ralph G.  
Fundamental methods of atmospheric sampling. Amer. Indust. Hyg. Assoc. Quart. 11: 7-10, 1950.
- Smith, W. J.; and Stafford, Earl.  
Development of a dry fibrous filter. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 264-272.

#### IV. Impingement & Impaction.

- \* Sonkin, L. S.  
Application of the cascade impactor to studies of bacterial aerosols. Amer. J. Hyg. 51: 319-342, 1950.
- \* Sonkin, L. S.  
Modified cascade impactor; device for sampling and sizing aerosols of particles below one micron in diameter. J. Indust. Hyg. & Toxicol. 28: 269-272, 1946.
- Stairmand, G. J.  
Dust collection by impingement and diffusion. Trans. Inst. Chem. Engin. 28: 130-139, 1950.
- \* Stanford Research Institute.  
Second interim report on the smog problem in Los Angeles County. Chap. III. Analysis of the air-particulate matter. Los Angeles, Western Oil & Gas Assoc., 1949. p. 22-29.
- \* Stokinger, H. E.; and Laskin, S.  
Air pollution and the particle size toxicity problems. II. Nucleonics. 6(3): 15-31, 1950.
- \* Thomas, M. D.  
The present status of the development of instrumentation for the study of air pollution. Proc. 2d Natl. Air Pollution Symposium, 1952. p. 16-23.
- \* Thomas, M. D.; and Ivie, J. O.  
Automatic apparatus for the determination of small concentrations of sulfur dioxide and other contaminants in the atmosphere. U.S. Tech. Conf. on Air Pollution, 1952. p. 567-579.
- Tillson, B. F.  
Determining the dust content of atmospheric air with the impinger. Eng. Mining J. 135: 358-361, 1934. Chem. Abstr. 28: 6222.
- \* U.S. Public Health Service.  
All glass midget impinger. Indust. Engin. Chem., Anal. Ed. 16: 346, 1944.
- U.S. Public Health Service.  
Comparative tests of instruments for determining atmospheric dusts. U.S. Pub. Health Bull. No. 144, 1925. 69p.
- Van Atta, F. A.; and McClure, O. H.  
Improved air-sampling device for field work. Illinois State Dept. Labor, Div. Factory Inspection. Tech. Paper No. 2, 1941. p. 3-9.
- Van Idempt, J.; and Van Uden, J.  
A glass vacuum konimeter. Chem. Weekblad. 37: 691, 1940. Chem. Abstr. 36: 4737<sup>c</sup>.
- Vigdorick, E.  
Determination of dust in the air by the Owens method. Cig. i Epidem. No. 11: 10-19, 1928.
- \* Voegtlin, Carl; and Hodge, H. C.  
Pharmacology and toxicology of uranium compounds. Chap. 10, pt. 8, p. 449-506, Methods and procedures. New York, McGraw-Hill, 1949.
- Wallach, A.; and O'Brien, E. P.  
Simplified field method for determining hygienically significant amounts of hydrogen sulfide in air. Proc. Montana Acad. Sci. 10: 39-45, 1950.
- Warren, P. H.; and Read, T. A.  
Methods and apparatus for the determination of dust suspended in air. Proc. Australasian Inst. Min. Met., n.s. No. 47: 297-342, 1922.
- \* Watson, H. H.  
A note on the shattering of dust particles in the impinger. J. Indust. Hyg. & Toxicol. 21: 121-123, 1941.

#### IV. Impingement & Impaction.

Weeks, W. S.

Dust sampling - a device for adjusting the nozzle distance in the Devers circular konimeter. *Canad. Mining J.* 61: 29, 1940. *Chem. Abstr.* 34: 1771<sup>4</sup>.

\* Wells, W. F.

Apparatus for the study of the bacterial behavior of air. *Amer. J. Pub. Health.* 23: 58-59, 1933.

\* Wilcox, J. D.

Design of a new five-stage cascade impactor. *Arch. Indust. Hyg. Occupa. Med.* 7: 376-382, 1953.

\* Williams, C. R.

A method of counting samples taken with the impinger. *J. Indust. Hyg. & Toxicol.* 21: 226-230, 1939.

\* Williams, R. E. O.; and Hirsch, Ann.

Bacterial contamination of air in underground trains. With an appendix on slit-sampler for long period sampling of air for bacteria. *Lancet.* 1: 128-131, 1950.

Wilson, L. D.

A gas ejector for air sampling. *Indust. Hyg. Quart.* 12: 58, 1951.

Winslow, C. E.

A new method of enumerating bacteria in air. *Science.* 28: 28-31, 1908.

\* Winslow, C. E. A.; et al.

Report of the committee on standard methods for the examination of the air. *Amer. J. Pub. Health.* 10: 450-454, 1920.

Winslow, C. E. A.; and Jordan, Robert.

The comparative efficiency of the circular konimeter and the Palmer water spray apparatus for the determination of the dust content of the air. *J. Indust. Hyg. & Toxicol.* 4: 375-379, 1923.

\* Yaffe, C. D.; Hosey, A. D.; and Chambers, J. T.

The spiral sampler, a new tool for studying particulate matter. *Arch. Indust. Hyg. & Occupa. Med.* 5: 62-70, 1952.

Yant, W. F.; Levy, E.; Sayers, R. R.; Brown, C. E.; Traubert, C. E.; Frevert, H. W.; and Marshall, K.L. Carbon monoxide and particulate matter in air of Holland Tunnel and metropolitan New York. *Bur. Mines Rept. Invest. No. 3585*, 1941.



BIBLIOGRAPHY ON  
METHODS OF SAMPLING AIRBORNE PARTICLES.  
V. OPTICAL & PHOTOMETRIC METHODS.

- \* Barnes, M. D.; and La Mer, V. K.  
Monodispersed hydrophobic colloidal dispersions and light scattering properties. II. Total scattering from transmittance as a basis for the calculation of particle size and concentration. *J. Colloid Sci.* 1: 79-91, 1946.
- \* Beadle, D. G.  
Photography of fine dust particles. *J. Sci. Instr.* 16: 262-63, 1939.
- \* Bean, R. D.  
A smoke density meter. *J. Sci. Instr.* 9: 391-392, 1932.
- Belkin, E. S.; and Kosenko, A. I.  
A portable ultramicroscope for the determination of the concentration of submicroscopic particles in the air of industrial undertakings. *Gigiena.* No. 8: 50-51, 1951. *Abstr. World Med.* v. 11, #491, 1952.
- Bennett, M. G.  
The physical conditions controlling visibility through the atmosphere. *Quart. J. Roy. Met. Soc.* 56: 1-29, 1930.
- Berger, L. B.; and Schrenk, H. H.  
Laboratory equipment for the analysis of mine atmospheres. *U.S. Bur. Mines Informa. Circ.* no. 7441, 1948. 18p.
- Berger, L. B.; and Schrenk, H. H.  
Miner's circular No. 34, Sampling and analysis of mine atmospheres. *U.S. Bur. Mines*, 1948.
- Blacktin, S. C.  
The direct view particle counter and portable ultra-microscope. *J. Soc. Chem. Indust.* 57: 361-363, 1938. *Chem. Abstr.* 33: 1179.
- Blacktin, S. C.  
Efficiencies for particle determination of the electrotor meter, the ultramicroscope, and the settlement counter. *J. Soc. Chem. Indust.* 61: 161-162, 1942. *Chem. Abstr.* 37: 1063<sup>3</sup>.
- Blacktin, S. C.  
The electrotor dust and smoke meter. *J. Indust. Hyg. & Toxicol.* 18: 583-594, 1936. *Chem. Abstr.* 31: 293<sup>9</sup>.
- Blacktin, S. C.  
Instrument for both counting and weighing particles of dusts, smokes and other dispersions. *J. Soc. Chem. Indust.* 56: 281-3T, 1937. *Chem. Abstr.* 31: 8261<sup>1</sup>.
- Blacktin, S. C.  
Range of electrotor meter demonstrated by dark field count. *J. Indust. Hyg. & Toxicol.* 19: 579-589, 1937. *Chem. Abstr.* 32: 2245<sup>8</sup>.
- Brown, C. E.  
Midget microprojector for dust determination. *U.S. Bur. Mines Rept. Invest.* No. 3780, 1944. 14p.

- Brown, C. E.; Baum, L. A.;  
Yant, W. P.; and Schrenk, H. H.  
Microprojection method for  
counting impinger dust samples.  
U. S. Bur. Mines Rept. Invest. No.  
3373, 1938. 9p.
- Brown, C. E.; Beatty, R. L.; and  
Kirby, T. B.  
Dust-counting cells. U. S. Bur.  
Mines Informa. Circ. No. 7331,  
1945. 9p.  
Chem. Abstr. 39: 5133<sup>9</sup>.
- \* Brown, C. E.; and Schrenk, H. H.  
Relation between and precision  
of dust counts, (light- and dark-  
field) from simultaneous impinger,  
midget impinger, electric precipi-  
tator and filter-paper samples.  
U. S. Bur. Mines, Rept. of Invest.  
No. 4568, 1949. 35p.
- \* Brown, C. E.; and Schrenk, H. H.  
Standard methods for measuring  
the extent of atmospheric pollu-  
tion. U. S. Bur. Mines Informa.  
Circ. No. 7210, 1942. 19p.
- Brown, C. E.; and Yant, W. P.  
Micro-projector for determining  
particle size distribution and  
number concentration of atmospheric  
dust. U. S. Bur. Mines Rept.  
Invest. No. 3289, 1935. 8p.  
Chem. Abstr. 29: 7707<sup>5</sup>.
- Bungardner, H. E.  
Smoke density measurements.  
Mech. Engin. 60: 610-612, 1938.  
Chem. Abstr. 32: 7798<sup>6</sup>.
- Cadden, J. F.; and Rothman, E. T.  
Photometric method for making  
dust determinations. Bur. Indust.  
Hyg., State Health Dept.  
Charleston, West Va., 1939.  
Chem. Abstr. 36: 1565<sup>2</sup>.
- \* Cadle, R. D.; Rubin, Sylvan;  
Glassbrook, C. I.; and Magill, B. S.  
Identification of particles in  
Los Angeles smog by optical and  
electron microscopy. Arch. Indust.  
Hyg. Occupa. Med. 2: 698-715, 1950.
- \* Chaney, A. L.  
Direct photography of aerosol  
suspensions. Proc. U. S. Tech. Conf.  
on air pollution, 1952. p. 603-606.
- \* Chaney, A. L.  
A recording visibility meter.  
U. S. Tech. Cong. on air pollution,  
1952. p. 679-682.
- \* Coolidge, J. E.; and Schulz, G. J.  
Photoelectric measurement of  
dust. Instruments. 24: 534, 544,  
578-580, 1951.
- \* Crossman, G.  
Counting of dust particles by  
phase microscopy. Arch. Indust.  
Hyg. Occupa. Med. 6: 416-420, 1952.
- Davidson, W. F.  
A study of atmospheric pollution.  
Monthly Weather Rev. 70: 225-234,  
1942.
- Davidson, W. F.; and Master, Warren.  
Automatic dust damping and  
analyzing instruments for atmos-  
pheric pollution surveys. Monthly  
Weather Rev. 69: 257-260, 1941.
- Deriagin, B. V.; and Vlasenko, G.  
Continuous ultramicroscopic  
method of dispersion analysis of  
aerosols and hydrosols. Vestnik  
Akad. Nauk. SSSR. 21: 76-78, 1951.
- Deriagin, B. V.; and Vlasenko, G.  
The flow method of ultramicro-  
scope measurement of the particle  
concentration of aerosols and  
other dispersion systems.  
USSR Acad. Sci. Repts. 63: 155-158,  
1948. Chem. Abstr. 43: 2068e.

# V. Optical & Photometric Methods.

- \* Dickey, P. S.  
Measuring smoke density; sealed beam bolometer system. *Electronics*. 23(4): 93-95, 1950.
- \* Drinker, Philip; and Hatch, Theodore.  
Industrial dust; hygienic significance, measurement and control. New York, McGraw-Hill, 1936.
- Drinker, Philip; Thomson, R. M.; and Fitchet, S. M.  
Atmospheric particulate matter. II. The use of electric precipitation for quantitative determinations and microscopy. *J. Indust. Hyg. & Toxicol.* 5: 162-185, 1923. *Chem. Abstr.* 17: 3733.
- Ehrhardt, W.  
On the techniques of evaluating konimeter spots. *Staub*. No. 26: 333-341, 1951. *Bull. Hyg.* 27: 939, 1952.
- Faber, O. M.  
Gravimetric, tyndallmetric and konimetric measurement of dust. *Staub*. 7: 372-408, 1937.
- Faber, O. M.  
Methods of measurement for the examination of small samples of dust. *Staub*. 8: 446, 1938. *Chem. Abstr.* 34: 77817.
- \* Ferry, R. M.; Farr, L. M.; and Hartman, Mary G.  
The preparation and measurement of the concentration of dilute bacterial aerosols. *Chem. Rev.* 44: 389-417, 1949.
- Ficklen, J. B.; and Ott, L. H.  
Photographic dust counter for industrial health purposes. *J. Indust. Hyg. & Toxicol.* 17: 164-73, 1935. *Bull. Hyg.* 10: 618, 1935.
- \* Forbes, J. J.; Davenport, Sara J.; and Morgis, Genevieve G.  
Review of literature on dusts. p. 127-148, Dust sampling methods. U.S. Bur. Mines Bull. 478, 1950. 333p.
- Franks, W. R.; and Tressidder, L. C.  
Photometric estimation of konimeter dust samples. *Mining Mag.* 51: 265-71, 1934. *Chem. Abstr.* 29: 4265.
- Friess, Herbert.  
Optical properties of smoke particles. *Gasmaskes*. 9: 137-140, 1937. *Chem. Abstr.* 32: 26468.
- Galadshii, F. M.  
Portable apparatus for determining coal dust concentration. *Ugol.* 26(7): 31-32, 1951.
- \* Gibbs, W. M.  
Clouds and smokes; the properties of disperse systems in gases and their practical applications. London, J. & A. Churchill, 1924.
- \* Gitzen, W. H.  
Identification of free silica in dusts and fumes. *Anal. Chem.* 20: 265-267, 1948.
- Green, H. L.  
Some accurate methods of determining the number and size frequency of particles in dusts. *J. Indust. Hyg. & Toxicol.* 16: 29-39, 1934. *Chem. Abstr.* 28: 20773.
- \* Gucker, F. T.  
Aerosols. *Sci. Monthly.* 68: 373-385, 1949.
- \* Gucker, F. T.  
Determination of concentration and size of particulate matter by light scattering and sonic techniques. *Proc. 1st. Natl. Air Pollution Symposium*, 1949. p. 14-25.

# V. Optical & Photometric Methods.

- \* Gucker, F. T.  
Instrumental methods of measuring mass concentration and particulate concentration in aerosols. Proc. U. S. Tech. Conference on Air Pollution, 1952. p. 617-633.
- \* Gucker, F. T.  
Instrumental methods of studying some properties of aerosols. Science. 110: 372-374, 1949.
- \* Gucker, F. T.  
Sensitive photoelectric photometer. Electronics. 20(7): 106-110, 1947.
- \* Gucker, F. T.; and O'Konski, C. T.  
Electronic methods of counting aerosol particles. Chem. Rev. 44: 373-388, 1949.
- \* Gucker, F. T.; and O'Konski, C. T.  
An improved photoelectric counter for colloidal particles, suitable for size-distribution studies. J. Colloid Sci. 4: 541-560, 1949.
- \* Gucker, F. T.; O'Konski, C. T.; Pickard, H. G.; and Pitts, J. N.  
Photoelectric counter for colloidal particles. J. Amer. Chem. Soc. 69: 2422-2431, 1947.
- \* Gucker, F. T.; Pickard, H. B.; and O'Konski, C. T.  
Photo-electric instrument for comparing the concentrations of very dilute aerosols and measuring low light intensities. J. Amer. Chem. Soc. 69: 429-438, 1947.
- Hales, J. S.  
The measurement of smoke density. A new type of kapnometer. Fuel. 19: 231-234, 1940. Chem. Abstr. 35: 1963<sup>8</sup>.
- \* Hall, S. R.  
Evaluation of particulate concentrations with collecting apparatus. Anal. Chem. 24: 996-1000, 1952.
- Hamly, D. H.; and Pullen, P. F.  
Dust quantitation by microprojection and comparison counting. Trans. Canad. Inst. Mining Met. 45: 140-153, 1942. Chem. Abstr. 36: 6841<sup>8</sup>.
- \* Harris, W. B.  
Modified eyepiece micrometer for use in dust counting. J. Indust. Hyg. & Toxicol. 23: 148-150, 1941.
- Basselt. Institut d'Hygiene des Mines.  
Konimetry. Construction and use of a filtering apparatus for the determination of atmospheric dust content. Communication No. 22. Gen. 35, 1947. Sp. Bull. Hyg. 22: 703, 1947.
- Hatch, Theodore; and Pool, C. L.  
Quantitation of impinger dust samples by dark field microscopy. J. Indust. Hyg. & Toxicol. 16: 177-191, 1934. Bull. Hyg. 9: 596, 1934.
- Hazard, W. G.  
An atmospheric dust recorder. J. Franklin Inst. 217: 571, 1934.
- Hazard, W. G.; and Drinker, Philip.  
An atmospheric dust recorder. J. Indust. Hyg. & Toxicol. 16: 192-196, 1934. Bull. Hyg. 9: 596, 1934.
- \* Hebley, H. F.  
Factors rarely considered in smoke abatement. Mech. Engin. 69: 281-287, 1947.
- Hill, A. S. G.  
Measurement of the optical densities of smoke stains on filter papers. Trans. Faraday Soc. 32: 1125-1131, 1936. Chem. Abstr. 30: 7242<sup>6</sup>.
- \* Hill, A. S. G.  
A photo-electric smoke penetrometer. J. Sci. Instr. 14: 296-303, 1937.

# V. Optical & Photometric Methods.

- Hochberg, S.  
A balanced photoelectric smoke filter penetration photometer. OSRD Rept. 865, Part V., Sept., 1942.
- Holt, P. F.  
The study of dusts in industrial atmospheres. 6. Photoelectric apparatus and apparatus for the collection of large samples. Metallurgia. 44: 108-110, 1952.
- \* Holt, P. F.; and Chalk, A. J.  
New method for monitoring air-borne dust. Arch. Indust. Hyg. Occupa. Med. 7: 404-410, 1953.
- \* Inn, E. C. Y.  
Measurement of particle size and concentration of homogeneous aerosols. J. Colloid Sci. 6: 368-371, 1951.
- Jeppe, C. W. B.; and Halliday, E. O.  
Notes on an instrument designed to record continuously the amount of dust in air. J. Chem. Met. Mining Soc. South Africa. 38: 75-80, 1937. Chem. Abstr. 32: 3<sup>2</sup>.
- \* Katz, Morris.  
The photoelectric determination of atmospheric sulfur dioxide by dilute starch-iodine solutions. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 580-595.
- \* Keenan, R. G.; and Byers, D. H.  
Rapid analytical method for air pollution surveys; the determination of total particulates and the rapid semiquantitative spectrographic method of analysis of the metallic constituents in high volume samples. Arch. Indust. Hyg. Occupa. Med. 6: 226-230, 1952.
- Kimball, H. H.; and Hand, I. F.  
Investigations of the dust content of the atmosphere. Monthly Weather Rev. 59: 349-352, 1931.
- Kinkel'shtein, D. N.; and Podgaitz, V. V.  
Microdetermination of aerosols. III. Determination of selenious anhydride. J. Appl. Chem. USSR. 11: 1033-1042, 1938. Chem. Abstr. 33: 1629<sup>9</sup>.
- Laguarta, E. M.  
A modification of the counting method for determining particle number. Kolloid Zeitschr. 102: 268, 1943. Chem. Abstr. 37: 5909.
- \* La Mer, V. K.  
Monodisperse colloids and higher order Tyndall spectra. J. Phys. & Coll. Chem. 52: 65-78, 1948.
- \* La Mer, V. K.  
The preparation, collection and measurement of aerosols. Proc. 1st. Natl. Air Pollution Symposium, 1949. p. 5-13.
- La Mer, V. K.  
Progress report on "Verification of Mie theory---calculations and measurements of light scattering by dielectric spherical particles." OSRD Rept. No. 1857, PB report 944, 1945. 97p.
- La Mer, V. K. et al.  
The optical characterization of any aerosol in the laboratory or field. The production of aerosols from powdered solid materials. Final report, Oct. 31, 1944. OSRD Rept. 4904, PB Rept. 32208.
- \* La Mer, V. K.; Inn, E. C. Y.; and Wilson, I. B.  
The methods of forming, detecting, and measuring the size and concentration of liquid aerosols in the size range of 0.01 to 0.25 microns diameter. J. Colloid Sci. 5: 471-496, 1950.

## V. Optical & Photometric Methods.

- La Mer, V. K.; and Sinclair, D.  
A portable optical instrument for the measurement of particle size in smokes, the "Owl"; and an improved homogeneous aerosol generator. OSRD Rept. No. 1668, Aug., 1943. PB Rept. 32200.
- Ljunggren, Gustaf; and Wilner, Torsten.  
Aerosol indicator for rapid test of the dust content of air. Teknisk. Tidskrift. 80: 551-552, 1950.
- Lloyd, H.; Winder, G. M.; and Gillard, D. A.  
An automatic dust sampler. Safety in mines research establishment, Portobello, St. Sheffield. Research Rept. No. 29, 1951. 19p. Bull. Hyg. 27: 1122, 1952.
- \* Magill, P. K.  
Sampling procedures and measuring equipment. Manufacturing Chemists Association Air Pollution Abatement Manual, 1952. Chap. 6. 39p.
- Marks, L. S.  
Inadequacy of the Ringelmann chart. Mech. Engin. 59: 681-685, 1937.
- Matthiass; and Landwehr.  
Recent observations and precautions in the control of silicosis. Zeitschr. Berg.-Hütten- und Salinenwesen. p. 421-446, 1935.
- \* Meller, H. B.  
The capnometer, an instrument for the measuring of air pollution. Science. 71: 344-345, 1930.
- Mie, G.  
Beiträge zur Optik trüber Medien, speziell kolloider metallösungen. Ann. Physik. 25: 377-445, 1908.
- Nagao, Huzio; and Tanabe, Kenzi.  
On the measurement of exhaust-gas (smoke) density. Trans. Soc. Mech. Engrs., Japan. 5(20)II: 9-13, 1939. Chem. Abstr. 35: 4179J.
- Nolan, P. J.; and Pollack, L. W.  
The calibration of a photoelectric nucleus counter. Proc. Roy. Irish Acad. 51(Sec. A, No. 2): 9-31, 1946.
- Nonhebel, G.; Colvin, J.; Patterson, H. S.; and Whytlaw-Gray, R.  
Coagulation of smokes and the theory of Smoluchowski. Proc. Roy. Soc. 116A: 540-553, 1927. Chem. Abstr. 22: 8982.
- Owens, J. S.  
The smoke of cities. Proc. Inst. Mech. Engrs. 134: 211-275, 1936. Chem. Abstr. 31: 59142.
- Patterson, H. S.; and Whytlaw-Gray, R.  
On the densities of particles in smokes. Proc. Roy. Soc. 113A: 302-311, 1926.
- Patterson, H. S.; Whytlaw-Gray, R.; and Cawood, W.  
The process of coagulation in smokes. Proc. Roy. Soc. London. 124A: 502-522, 1929. Chem. Abstr. 23: 48669.
- Peterson, A. H.  
Electronic measurements of aerosols and gases by means of scattered light. PhD Thesis, Indiana Univ., 1950.
- Potter, N. M.  
Micro and semi-micro methods for the investigation of airborne mine dusts. Bull. Hyg. 22: 44, 1947.
- Riedel, G.; and Buska, H.  
Supermicroscopic determination of the number of particles of a sol by means of its aerodispersed state. Kolloid-Zeitschr. 96: 86-96, 1941. Chem. Abstr. 36: 6393.

# V. Optical & Photometric Methods.

- \* Robertson, A. C.; Mulder, J. G.;  
and Van Saun, F. G.  
Measuring smokes and rating  
efficiencies of industrial air  
filters. *Indust. Engin. Chem.*  
*Anal. Ed.* 13: 331-334, 1941.
- Sawford, Frank.  
A smoke-density meter. *Mech.*  
*Engin.* 49: 999-1004, 1927.  
*Chem. Abstr.* 21: 3444.
- Schweckendiek, O. M.  
An observation chamber for ultra-  
microscopic investigations on  
aerosols. *Zeitschr. f. Naturforsch.*  
5a: 153-156, 1950.  
*Abstr. in Physics Abstr.* #6807,  
1950.
- Seidenberg, J. Z.  
Method of measuring the concen-  
tration and particle size of  
natural aerosols. *Compt. Rend.*  
*Acad. Sci. URSS.* 46: 227-228, 1945.
- Shagan, I. B.  
The use of the nephelometer for  
the determination of concentration  
and dimensions of smoke particles  
in the atmosphere of industrial  
plants. *igiene i Sanit.* 13:  
20-27, 1948.  
*Chem. Abstr.* 43: 7271a.
- \* Simon, A. W.; Kron, L. O.;  
Watson, C. H.; and Raymond, H.  
A recording dust concentration  
meter and its application to the  
blast furnace. *Rev. Sci. Instr.*  
2: 67-83, 1931.
- Sinclair, David.  
A high sensitivity smoke meter.  
*OSRD Rept. No. 865, Part V.,*  
Sept., 1942.
- \* Sinclair, David; and La Mer, V. K.  
Light scattering as a measure  
of particle size in aerosols.  
*Chem. Rev.* 44: 250-251, 1949.
- \* Steffens, C.  
Measurement of visibility by  
photographic photometry. *Indust.*  
*Engin. Chem.* 41: 2396-2399, 1949.
- \* Steffens, C.; and Rubin, S.  
Visibility and air pollution.  
*Proc. 1st Natl. Air Pollution*  
*Symposium, 1949.* p. 103-108.
- \* Stokinger, H. E.; and Laskin, Sidney.  
Air pollution and the particle-  
size toxicity problems. II.  
*Nucleonics.* 6(3): 15-31, 1950.
- Stone, D. E.; Kane, L. J.;  
Corrigan, T. E.; Wainwright, H. W.;  
and Seibert, C. B.  
Investigation of a photoelectric  
device for the determination of low  
concentrations of dust. *U.S. Bur.*  
*Mines Rept. Invest. No. 4782, 1951.*  
6p. *Chem. Abstr.* 45: 4911e.
- Stumpf, K. M.  
Determination of particle number  
in aerocolloidal systems by means of  
the slit ultramicroscope and the  
rate of coagulation in aerosols.  
*Kolloid Zeitschr.* 86: 339-361, 1939.  
*Chem. Abstr.* 33: 41067.
- \* Te-Tchao, Quang.  
Counting of particles suspended  
in air. *Compt. Rend. Acad. Sci.*  
203: 855-857, 1936.
- \* Thomas, M. D.  
The present status of the  
development of instrumentation for  
the study of air pollution. *Proc.*  
*2d Natl. Air Pollution Symposium,*  
1952. p. 16-23.
- \* Tolman, R. C.; Gerke, R. H.;  
Brooks, A. P.; Herman, A. G.;  
Mulliken, R. S.; and Smyth, H. D.  
Relation between intensity of  
Tyndall beam and size of particles.  
*J. Amer. Chem. Soc.* 41: 575-587,  
1919.

V. Optical & Photometric Methods.

- \* Tolman, R. C.; Reyerson, L. H.;  
Vliet, E. B.; Gerke, K. H.; and  
Brooks, A. P.  
Relation between the intensity of  
Tyndall beam and concentration of  
suspensions and smokes. J. Amer.  
Chem. Soc. 41: 300-303, 1919.
- \* Tolman, R. C.; and Vliet, E. B.  
A tyndallmeter for the examina-  
tion of disperse systems. J. Amer.  
Chem. Soc. 41: 297-300, 1919.
- Von Brand, E. K.  
Applications of a portable con-  
tinuous smoke recorder. Mech.  
Engin. 72: 479-481, 1950.
- Vonnegut, Bernard.  
A continuous recording condensa-  
tion nuclei meter. Proc. 1st.  
Natl. Air Pollution Symposium, 1949.  
p. 36-44.
- Watson, H. H.  
Dust sampling in a Haematite mine  
with the PRU hand pump. Brit. J.  
Indust. Med. 5: 198-203, 1948.
- Watson, P. D.; and Kibler, A. L.  
Relation between obscuring power  
and particle number and size of  
screening smokes. J. Phys. Chem.  
35: 1074-1090, 1931.
- Wey, R. J.  
Photoelectric smoke meters.  
Engineer. 173: 283-285; 300-303;  
320-322; 342-345, 1942.
- \* Whytlaw-Gray, R.; and Patterson, H. S.  
Smoke: a study of aerial disperse  
systems. London, Edward Arnold & Co.,  
1932.
- Whytlaw-Gray, R.; Speakman; and  
Campbell.  
Smokes. I. Study of their be-  
havior and a method of determining the  
number of particles they contain.  
Proc. Roy. Soc. London. 102A: 600-627,  
1923.
- Wilcox, J. D.; and Van Antwerp, W. R.  
A new sampling technique; particle  
size distribution by combined use of  
the optical and electron microscope.  
Interim Rept. 70, Chem. & Radiological  
Laboratories, Army Cml. Center, Md.  
February, 1952.
- Winkel, A.; and Witt, W.  
Photographing particles of aerosols  
as an objective means of measurement.  
Zeitschr. f. Elektrochem. 42: 281-285,  
1936. Chem. Abstr. 30: 5093<sup>6</sup>.
- Zaidenberg, Y. Z.  
A method of measuring the concen-  
tration and particle size of natural  
aerosols. Compt. Rend. Acad. Sci.  
URSS. 46: 227-228, 1945. (In English).  
Chem. Abstr. 39: 5152.



# BIBLIOGRAPHY ON

## METHODS OF SAMPLING AIRBORNE PARTICLES.

### VI. SEDIMENTATION & GRAVIMETRIC METHODS.

- Ashworth, J. R.  
Atmospheric pollution and the deposit gauge. Weather. 3: 137-140, 1948.
- Black, A. B.  
Sampling mine air for dust. Engin. Mining J. 135: 218-219, 1934. Chem. Abstr. 28: 3623.
- Blacktin, S. O.  
Criteria of dust determination; effects of particle-deposition technique. Chem. Age. 48: 575-579, 1943.
- Blacktin, S. O.  
Efficiencies for particle determination of the electrotor meter, the ultramicroscope, and the settlement counter. J. Soc. Chem. Indust. 61: 161-162, 1942. Chem. Abstr. 37: 10633.
- Boyd, James.  
The estimation of dust in mine air. Third Empire Mining Met. Congr. South Africa, 1930. 23p. Chem. Abstr. 24: 2691.
- \* Bredl, J.; and Grieve, T. W.  
A thermal precipitator for the gravimetric estimation of solid particles in flue gases. J. Sci. Instr. 28: 21-23, 1951.
- Briscoe, H. V. A.; Matthews, Janet W.; Holt, P. F.; and Sanderson, P. M.  
The sampling of industrial dusts by means of the "labyrinth". Bull. Inst. Mining Met., No. 393, 1937. 21p. Chem. Abstr. 31: 56231.
- Briscoe, H. V. A.; Matthews, Janet W.; Holt, P. F.; and Sanderson, P. M.  
The sampling of industrial dusts by means of the labyrinth. Bull. Inst. Mining Met. 394: 3-31, 1937.
- Briscoe, H.V.A.; Matthews, Janet W.; Holt, P. F.; and Sanderson, P. M.  
The sampling of industrial dusts by means of the labyrinth. J. Chem. Met. Mining Soc. South Africa. 38: 27-41, 1937.
- Briscoe, H.V.A.; Matthews, Janet W.; Holt, P. F.; and Sanderson, P. M.  
The sampling of industrial dusts by means of the labyrinth. J. Chem. Met. Mining Soc. South Africa. 38: 81-97, 1937.
- \* Brown, C. E.; and Schrenk, H. H.  
Standard methods for measuring the extent of atmospheric pollution. U.S. Bur. Mines Informa. Circ. No. 7210, 1942. 19p.
- \* Dalla Valle, J. M.  
Principles, design, applications and performance of dry inertial and motor powered separators. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 341-356.
- \* Des Voeux, H. A.; and Owens, J. S.  
The sootfall of London: its amount, quality and effects. Lancet. 1: 47, 1912.
- Erenburg, G. S.; Krasnogorskaya, M.N.; Livshits, I.I.; and Lykhina, E. T.  
Gravimetric and counting methods for determination of industrial dust contamination. Gigiena i Sanit. No. 7: 3-5, 1950.

## VI. Sedimentation & Gravimetric Methods.

- Faber, O. M.  
Gravimetric, Tyndallmetric and  
konimetric measurement of dust.  
Staub. 7: 372-408, 1937.
- Finn, S. R.; and Powell, E. O.  
The chemical and physical investi-  
gation of germicidal aerosols. II.  
The aerosol centrifuge. J. Hyg.  
42: 354-364, 1942.
- \* Forbes, J. J.; Davenport, Sara J.;  
and Morgis, Genevieve G.  
Review of literature on dusts.  
p. 127-148, Dust sampling methods:  
U.S. Bur. Mines Bull. No. 478, 1950.  
333p.
- Free, E. E.  
Soot particles in New York City  
air. Trans. Amer. Soc. Mech.  
Engrs. 53: 9-12, 1931.
- Gabran, O.  
A method for the separation of  
aerosols from snow and hail.  
Meteorol. Zeitschr. 55: 112-113,  
1938. Chem. Abstr. 34: 2673<sup>6</sup>.
- \* Gibbs, W. E.  
Clouds and smokes; the proper-  
ties of disperse systems in gases  
and their practical applications.  
London, J. & A. Churchill, 1924.
- Goodeve, O. F.  
The removal of mist by centri-  
fugal methods. Trans. Faraday  
Soc. 32: 1218-1223, 1936.  
Chem. Abstr. 30: 7244<sup>1</sup>.
- Green, H. L.  
Some accurate methods of  
determining the number and size  
frequency of particles in dusts.  
J. Indust. Hyg. & Toxicol.  
16: 29-39, 1934.  
Chem. Abstr. 28: 2077<sup>3</sup>.
- \* Greenburg, Leonard.  
The industrial dust problem.  
II. Review of the methods used for  
sampling aerial dust. Pub. Health  
Repts. 40: 765-786, 1925.
- Jötten, K. W.; and Sartorius, F.  
New apparatus for determining  
dust. Zentr. f. Gewerbehyg.  
Unfallverhütung. 17: 312-320, 1930.  
Chem. Abstr. 25: 3524<sup>5</sup>.
- Juschmanov, E.; and Popilski, M.  
Determination of dust in flowing  
gases. Zavod. Lab. 5: 820-824,  
1936.
- \* Kay, Kingsley.  
Analytical methods used in air  
pollution study. Indust. Engin.  
Chem. 44: 1383-1388, 1952.
- \* MacDonald, K.  
The efficiency of the Wells air  
centrifuge as determined by an air-  
washing technique. Amer. J. Hyg.  
31(B): 85-87, 1940.
- \* Magill, P. L.  
Sampling procedures and measuring  
equipment. Manufacturing Chemists  
Association Air Pollution Abatement  
Manual, 1952. Chap. 6. 39p.
- Miquel, P.  
Study on the dusts formed in the  
atmosphere. Ann. d'Hyg. 2: 226,  
333, 1879.
- Mitchell, J. P.  
The determination of dust fall  
in the neighborhood of cement plants.  
J. Indust. Eng. Chem. 6: 454, 1914.
- Naeslund, Carl.  
Rapid determination of dust in  
air. J. Indust. Hyg. & Toxicol.  
14: 113-116, 1932.  
Chem. Abstr. 26: 2941<sup>4</sup>.

## VI. Sedimentation & Gravimetric Methods.

- Owens, J. S.  
The measurement of atmospheric pollution. Quart. J. Roy. Meteor. Soc. 44: 149-170, 1918.
- \* Parker, A.; and Richards, S. H.  
Instruments used for the measurement of atmospheric pollution in Great Britain. U.S. Tech. Conf. on Air Pollution, 1952. p. 531-546.
- Patterson, H. S.; and Cawood, W.  
The determination of size distribution in smokes. Trans. Faraday Soc. 32: 1084-1088, 1936.  
Chem. Abstr. 30: 7240<sup>8</sup>.
- \* Phelps, E. B.  
The state of suspension of bacteria in the air as measured by settling rates. AAAS, Aerobiology, 1942. p. 133-137.
- \* Phelps, E. B.; and Buchbinder, Leon.  
Studies on microorganisms in simulated room environments. II. A study of the performance of the Wells air centrifuge and of the settling rates of bacteria through the air. J. Bact. 42: 321-344, 1944.
- Shafir, A. T.  
New Apparatus for bacteriological investigation of air. Sovet. Vrachebnyi Zhur. 45: 129-134, 1941.
- Smyth, H. G.  
A critical review of methods for the study of dust content of air. J. Indust. Hyg. & Toxicol. 1: 140-149, 1919.
- Stoyanovskii, A. F.  
Apparatus for counting the number of dust particles in the air. Gigiena i Sanit. No. 1: 16-20, 1951.  
Chem. Abstr. 45: 54591.
- \* Tervet, I. W.; and Cassell, R. C.  
The use of cyclone separators in race identification of cereal rusts. Phytopathology. 41: 286-290, 1951.
- \* Tervet, I. W.; Rawson, A. J.; Cherry, E.; and Saxon, R. B.  
A method for the collection of microscopic particles. Phytopathology. 41: 282-285, 1951.
- \* Thomas, M. D.  
The present status of the development of instrumentation for the study of air pollution. Proc. 2d Natl. Air Pollution Symposium, 1952. p. 16-23.
- Tissandier, G.  
The dusts of the atmosphere. Rev. Sci., Ser. 2. 17: 814, 1880.
- Tufty, H. G.; and Mathis, Eugene.  
New method for estimating dust in air. J. Amer. Soc. Heat. Vent. Engin. 33: 1-10, 1927.  
Chem. Abstr. 21: 1946<sup>5</sup>.
- Watson, H. H.; and Morris, T. G.  
Gravimetric sampling of dust in coal mines. Engineering. 174: 228-229, 1952.
- Watson, H. H.; and Morris, T. G.  
Gravimetric sampling of dust in coal mines. Engineering. 174: 228-229, 1952.
- Wells, W. F.  
Apparatus for the study of the bacterial behavior of air. Amer. J. Pub. Health. 23: 58-59, 1933.
- Whytlaw-Gray, R.; Cawood, W.; and Patterson, H. S.  
A sedimentation method of finding the number of particles in smokes. Trans. Faraday Soc. 32: 1055-1059, 1936.  
Chem. Abstr. 30: 7240<sup>6</sup>.

Yeomans, A. H.; Rogers, M. E.; and  
Ball, W. H.  
Deposition of aerosol particles.  
J. Econ. Entomol. 42: 591-596,  
1949.

# BIBLIOGRAPHY ON

## METHODS OF SAMPLING AIRBORNE PARTICLES.

### VII. SONIC & ULTRASONIC AGGLOMERATION.

- \* Adley, F. E.  
Symposium on the dynamics of  
industrial medicine; studying the  
environment. Arch. Indust Hyg.  
Occupa. Med. 3: 153-158, 1951.
- \* Agglomeration of aerosols; increas-  
ing industrial uses of ultrasonics.  
Chem. Age. 59: 287, 1948.
- Andrade, E. N. d. C.  
The coagulation of smokes by  
supersonic vibrations. Trans.  
Faraday Soc. 32: 1111-1115, 1936.
- Brandt, O.; and Freund, H.  
The aggregation of aerosols  
caused by high-frequency sound  
waves. Zeitschr. f. Physik.  
94: 348-355, 1935.  
Chem. Abstr. 29: 4235<sup>4</sup>.
- Brandt, O.; Freund, M.; and  
Hiedemann, E.  
The theory of acoustic coagula-  
tion. Kolloid Zeitschr.  
77: 103-115, 1936.
- Brandt, O.; and Hiedemann, E.  
The aggregation of suspended  
particles in gases by sonic and  
supersonic waves. Trans. Faraday  
Soc. 32: 1101-1110, 1936.  
Chem. Abstr. 30: 7242<sup>3</sup>.
- Brandt, O.; and Hiedemann, E.  
The properties of aerosols in  
an acoustic field. Kolloid-  
Zeitschr. 75: 129-135, 1936.  
Chem. Abstr. 30: 5093<sup>6</sup>.
- Coste, J. H.; and Courtier, G. B.  
Sulfuric acid as a disperse  
phase in town air. Trans. Faraday  
Soc. 32: 1198-1202, 1936.  
Chem. Abstr. 30: 7244<sup>2</sup>.
- \* Danser, H. W.; and Neumann, M. P.  
Industrial sonic agglomeration  
and collection systems. Indust.  
Engin. Chem. 41: 2439-2442, 1949.
- \* Gucker, F. T.  
Determination of concentration  
and size of particulate matter by  
light scattering and sonic techniques.  
Proc. 1st. Natl. Air Pollution  
Symposium, 1949. p. 14-25.
- Horsley, C. B.; and Seavey, G. C.  
Apparatus for agglomerating  
aerosols by sound waves.  
U.S. Pat. 2, 535, 679, Dec. 26,  
1950. Chem. Abstr. 45: 1393b.

## VII. Sonic & Ultrasonic Agglomeration.

- Neumann, E. P.; and Norton, J. L.  
Application of sonic energy to commercial aerosol collection problems. Chem. Engin. Prog. Monograph Series No. 1, Ultrasonics symposium. 47(1): 4, 1951.  
Chem. Abstr. 46: 662h.
- \* Neumann, E. P.; Soderberg, C. R.; and Fowle, A. A.  
Design, application, performance and limitations of sonic type flocculators and collectors. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 388-393.
- \* Nord, Melvin.  
Sonic precipitation of smoke, fumes and dust particles. Chem. Engin. 57(10): 116-119, 1950.
- Parker, R. C.  
Experiments on coagulation by supersonic vibrations. Trans. Faraday Soc. 32: 1115-1125, 1936.
- \* St Clair, Hillary.  
Agglomeration of smoke, fog or dust particles by sonic waves. Indust. Engin. Chem. 41: 2434-2438, 1949.
- \* St. Clair, Hillary.  
Theory and basic principles of the sonic smoke flocculator. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 382-387.
- St. Clair, Hillary; Spendlove, M. J.; and Potter, E. V.  
Flocculation of aerosols by high frequency sound. U.S. Bur. Mines Rept. Invest. No. 4218, 1948. 28p. Chem. Abstr. 42: 4423f.
- \* Stokes, C. A.  
Sonic agglomeration of carbon black aerosols. Chem. Engin. Prog. 46: 423-432, 1950.
- Thiede, Heinz.  
Ultrasonics and its application in technology. Zeitschr. f. Erzbergbau u. Metallhüttenw. 4: 212-221, 1951.  
Chem. Abstr. 45: 7834a.

BIBLIOGRAPHY ON  
METHODS OF SAMPLING AIRBORNE PARTICLES.

VIII. THERMAL PRECIPITATION.

- Bancroft, W. D.  
Thermal filters. J. Phys. Chem.  
24: 421-436, 1920.  
Chem. Abstr. 14: 2882.
- \* Barnes, E. O.  
Dust determinations. Amer.  
J. Pub. Health. 26: 274-280, 1936.
- \* Bedford, T.; and Warner, C. G.  
Chronic pulmonary disease in  
South Wales coalminers. Pt. II-A.  
Physical study of the dust hazard  
in certain mines. Collection and  
evaluation of dust samples.  
Great Britain Med. Res. Council,  
Spect. Rept. Series No. 244, 1943.  
p. 6-18.
- \* Bedford, T.; and Warner, C. G.  
Measurements of concentrations  
of air borne dusts. J. Indust.  
Hyg. & Toxicol. 24: 315-321, 1942.
- \* Bredl, J.; and Grieve, T. W.  
A thermal precipitator for the  
gravimetric estimation of solid  
particles in flue gases. J. Sci.  
Instr. 28: 21-23, 1951.
- \* Brown, C. E.; and Schrenk, H. H.  
Standard methods for measuring  
the extent of atmospheric pollution.  
U.S. Bur. Mines Informa. Circ. No.  
7210, 1942. 19p.
- \* Brunetti, Clelio; Magill, P. L.; and  
Sawyer, F. G.  
New developments in instrumenta-  
tion for air pollution studies.  
Proc. U.S. Tech. Conf. on Air  
Pollution, 1952. p. 643-55.
- Cadden, J. F.; and Rothman, E. T.  
Photometric method for making  
dust determinations. Bur. Indust.  
Hyg., State Health Dept., Charleston,  
West Virginia, Feb., 1939.  
Chem. Abstr. 1565<sup>c</sup>.
- \* Cadle, R. D.; Rubin, Sylvan;  
Glassbrook, C. I.; and Magill, P. L.  
Identification of particles in  
Los Angeles smog by optical and  
electron microscopy. Arch. Indust.  
Hyg. Occupa. Med. 2: 698-715, 1950.
- Catchpole, D. H. J.; Greeham, R. E.;  
and White, E.  
Airborne dust. Correlation of the  
thermal precipitator with P.R.U.  
hand-pump. Colliery Guardian.  
185: 792-796, 1952.
- Cawood, W.  
The movement of dust or smoke  
particles in a temperature gradient.  
Trans. Faraday Soc. 32: 1068-1073,  
1936. Chem. Abstr. 30: 7241<sup>3</sup>.
- Clusius, K.  
Dust separation by means of  
thermal diffusion. Zeitschr. Ver.  
deut. Ing. Verfahrenstech.  
No. 2: 23-24, 1941.
- \* Crozier, W. D.  
Airborne particle study. New  
Mexico School of Mines, Res. &  
Developm Div. Contract N7ONR-405,  
Task 1, Proj. Designation No.  
NR-082-013. Reports.

# VIII. Thermal Precipitation.

- \* Drinker, Philip; and Hatch, Theodore. Industrial dust; hygienic significance, measurement and control. New York, McGraw-Hill, 1936.
- Epstein, P. S.  
Zeitschr. f. Physik. 54: 537, 1929.
- \* Forbes, J. J.; Davenport, Sara J.; and Morgis, Genevieve, G.  
Review of literature on dusts, p. 127-148, Dust sampling methods. U.S. Bur. Mines, Bull. 478, 1950. 333p.
- \* Gibbs, W. E.  
Clouds and smokes; the properties of disperse systems in gases and their practical applications. London, J. & A. Churchill, 1924.
- Green, H. L.  
Recent developments in methods of sampling dusts. Inst Min. & Met. Bull 362, 1934. 21p.  
Chem. Abstr. 29: 61057.
- Green, H. L.  
The size frequency of particles in mineral dusts. Trans. Faraday Soc. 32: 1091-1100, 1936.  
Chem. Abstr. 30: 72419.
- Green, H. L.; and Watson, H. H.  
Physical methods for the estimation of dust hazard in industry. Great Britain, Med. Res. Council, Spec. Rept. Series 199, 1935. 56p. Bull. Hyg. 10: 291-292, 1935.
- \* Gucker, F. T.  
Aerosols. Scientific Monthly. 68: 373-385, 1949.
- \* Harrington, E. R.; and Crozier, W.D.  
A thermal precipitator for sparse dispersions of aerosols. New Mexico School of Mines, Res. & Devel. Div. Contract N7ONR-405, Task I. Proj. Designation No. NR-082-013, Tech. Rept. No. 2-NR, Dec., 1948.
- Hasselt. Institut d'Hygiene des Mines.  
Comparative results of simultaneous sampling by means of the thermal precipitator, midget impinger and soxhlet thimble. Gen./179, 1952. 17p. Bull. Hyg. 27: 938, 1952.
- Hatfield, R. D.  
A description of a new portable thermal precipitator assemblage for underground use. J. Chem. Met. Mining Soc. S. Africa. 42: 116-120, 1941. Chem. Abstr. 36: 37059.
- Holmsen, B.  
Apparatus for dust study in silicosis. Tid. Kjem. Bergvesen Met. 1: 165-168; 180-190, 1941.
- Holt, P. F.  
The study of dusts in industrial atmospheres. 1. The determination of the particle count. Metallurgia. 43: 151-152, 1951.  
Chem. Abstr. 45: 5338f.
- Holt, P. F.  
The study of dusts in industrial atmospheres. 2. The konimeter and jet sampling instruments. Metallurgia. 43: 203-204, 1951.
- \* Kay, Kingsley.  
Analytical methods used in air pollution study. Indust. Engin. Chem. 44: 1383-1388, 1952.
- \* Kethley, T. W.; Gordon, M. T.; and Orr, C.  
A thermal precipitator for aerobacteriology. Science. 116: 368-369, 1952.
- Lambrechts, J. d. V.  
A critical review of dust sampling methods employed in Witwatersrand gold mines. J. Chem. Met. Mining Soc. F. Africa. 41: 209-240, 1940; 41: 363-369, 1941.  
Bull. Hyg. 16: 439-440, 1941.

# VIII. Thermal Precipitation.

- \* La Mer, V. K.  
The preparation, collection and measurement of aerosols. Proc. U.S. Tech. Conf. on Air Pollution, 1952. p. 607-616.
- Magill, P. L.  
Determination procedures. Amer. Indust. Hyg. Assoc. Quart. 11: 55-63, 1950.  
Chem. Abstr. 45: 2612f.
- \* Magill, P. L.  
Sampling procedures and measuring equipment. Manufacturing Chemists Association Air Pollution Abatement Manual, 1952. Chap. 6. 39p.
- \* Magill, P. L.  
Techniques employed in the analysis of Los Angeles smog. Proc. 1st. Natl. Air Pollution Symposium, 1949. p. 61-68.
- Norman, G. H. C.  
Methods of sampling and dust determination in the mines of Ontario. Amer. Inst. Mining Met. Engrs. Tech. Pub. No. 857, 1937.  
2Op. Chem. Abstr. 32: 3953.
- Paranjpe, M. K.  
The convection and variation of temperature near a hot surface; the dust free or dark layer in relation to surface convection. Proc. Indian Acad. Sci. 4A: 423-35, 1936.
- Patterson, H. S.  
The sampling of mine dusts with the thermal precipitator. J. Chem. Met. Mining Soc. S. Africa. 39: 375-379, 1939.
- Patterson, H. S.  
Sampling of mine dusts with the thermal precipitator. Inst. Min. & Met. Bull 417, 1939. 7p.
- Poppoff, I. G.  
Dust sampling by thermal precipitation. Naval Radiological Defense Lab. Dec. 8, 1952. 18p.  
USNRDL-382.
- Roche, Louis.  
Measurement of dust concentration in the atmosphere. Rev. Ind. Minerale. No. 509: 205-210, 1946.  
Chem. Abstr. 41: 29436.
- \* Rosenblatt, P.; and La Mer, V. K.  
Motion of a particle in a temperature gradient. Thermal repulsion as a radiometer phenomenon. Phys. Rec. 70: 385-395, 1946.
- \* Ross, A. A.; and Shaw, N. H.  
Dust hazards in Australian foundries. Tech. Rept. No. 1, Indust. Welfare Flv., Dept. of Labour & National Service, Australia, 1943. 45p.
- Saxton, R. L.; and Ranz, W. E.  
Thermal force on an aerosol particle in a temperature gradient. Tech. Rept. No. 6, 80-1007, Contract No. AT(30-3)-28, U.S. Atomic Energy Commission.
- \* Schrenk, H. H.  
Rapid methods for the estimation of air dustiness. Amer. J. Pub. Health. 30: 1183-1189, 1940.
- \* Sinclair, David.  
Measurement of particle size and size distribution. U.S. Atomic Energy Commission, Handbook on aerosols, 1950. p. 97-116.
- Smith, R. G.  
Fundamental methods of atmospheric sampling. Amer. Indust. Hyg. Assoc. Quart. 11: 7-10, 1950.



## VIII. Thermal Precipitation.

- \* Stokinger, H. E.; and Laskin, Sidney.      Watson, H. H.  
Air pollution and the particle-      A system for obtaining from mine-  
size toxicity problems. II.      air samples for physical chemical  
Nucleonics. 6(3): 15-31, 1950.      and petrological examinations. J.  
Chem. Met. & Min. Soc. South Africa.  
37: 166-168, 1936.
- \* Vonnegut, B.; and Neubauer, R.  
Detection and measurement of  
aerosol particles by the use of  
electrically heated filament.  
Anal. Chem. 24: 1000-1005, 1952.
- Watson, H. H.  
Dust free space surrounding hot  
bodies. Trans. Faraday Soc.  
32: 1073-1084, 1936.  
Chem. Abstr. 30: 7241<sup>4</sup>.
- Winkel, A.; and Witzemann, H.  
Measurement of thermal motion  
of aerosols and its application to  
the determination of particle size.  
Zeitschr. Elektrochem. 46: 181-185,  
1940. Chem. Abstr. 34: 4636<sup>4</sup>.

## BIBLIOGRAPHY ON

### METHODS OF SAMPLING AIRBORNE PARTICLES.

#### IX. WASHING METHODS.

- \* Adley, F. E.  
Symposium on the dynamics of  
industrial medicine; studying the  
environment. Arch. Indust. Hyg.  
& Occupa. Med. 3: 153-158, 1951.
- Anthony, A. W.  
Two methods of wet scrubbing  
of gases for reduction of atmos-  
pheric pollution. Proc. Smoke  
Prevent. Assoc. Amer., 1948 26p.  
Chem. Abstr. 43: 4405e.
- Black, A. B.  
Sampling mine air for dust.  
Eng. Mining J. 135: 218-219, 1934.  
Chem. Abstr. 28: 3623.
- Brandt, A. D.  
Washers for particulate matter  
collection. Amer. Indust. Hyg.  
Assoc. Quart. 11: 73-80, 1950.
- \* Brown, C. E.; and Schrenk, H. H.  
A new technique for use of the  
impinger method. U.S. Bur. Mines  
Informa. Circ. No. 7026, 1938.  
20p.
- \* Brunetti, Clelio; Magill, P. L.; and  
Sawyer, F. G.  
New developments in instrumenta-  
tion for air pollution studies.  
Proc. U.S. Tech. Conf. on Air  
Pollution, 1952. p. 643-655.
- \* Drinker, Philip; and Hatch, Theodore.  
Industrial dust; hygienic  
significance, measurement and  
control. New York, McGraw-Hill,  
1936.

## IX. Washing Methods.

- \* Drinker, P. K.; Thompson, R. M.;  
and Fitchet, S. M.  
Atmospheric particulate matter.  
I. Dust, with a new apparatus for  
its determination. J. Indust.  
Hyg. & Toxicol. 5: 19-35; 62-78,  
1923.
- \* Du Buy, H. G.; and  
Hollaender, Alexander.  
Symposium on air-borne infection;  
sampling devices. Amer. J. Med.  
Sci. 209: 172-177, 1945.
- \* Du Buy, H. G.; Hollaender, Alexander;  
and Lackey, Mary D.  
A comparative study of sampling  
devices for air borne micro-  
organisms. Pub. Health Repts.  
Suppl. No. 184, 1945. 40p.
- \* Ekman, F. O.; and Johnstone, H. F.  
Collection of aerosols in a  
venturi scrubber. Indust. & Engin.  
Chem. 43: 1358-1363, 1951.
- \* First, M. W.; Moschella, Ralph;  
Silverman, Leslie; and  
Berly, Edward.  
Performance of wet cell washers  
for aerosols. Indust. & Engin.  
Chem. 43: 1363-1370, 1951.
- \* Forbes, J. J.; Davenport, Sara J.;  
and Morgis, Genevieve G.  
Review of literature on dusts,  
p. 127-148. Dust sampling methods.  
U.S. Bur. Mines Bull. 478, 1950.  
333p.
- \* Gibbs, W. E.  
Clouds and smokes; the pro-  
perties of disperse systems in gases  
and their practical applications.  
London, J. & A. Churchill, 1924.
- \* Greenburg, Leonard.  
The industrial dust problem. II.  
Review of the methods used for  
sampling aerial dust. Pub. Health  
Repts. 40: 765-786, 1925.
- \* Johnstone, H. F.; and Roberts, M. H.  
Deposition of aerosol particles  
from moving gas streams. Indust.  
& Engin. Chem. 41: 2417-2423, 1949.
- Katz, S. H.; Longfellow, E. S.;  
and Fieldner, A. C.  
Efficiency of the Palmer apparatus  
for determining dust in air.  
J. Indust. Hyg. & Toxicol.  
2: 167-177, 1920.
- Katz, S. H.; Smith, G. W.; and  
Meyers, W. M.  
Determinations of air dustiness  
with the sugar tube, Palmer apparatus  
and the impinger, compared with  
determinations with the konimeter.  
J. Indust. Hyg. 3: 300-306, 1926.
- Katz, S. H.; Smith, G. W.;  
Meyers, W. M.; Trostel, L. J.;  
Ingels, M.; and Greenburg, L.  
Comparative tests of instruments  
for determining atmospheric dust.  
U.S. Pub. Health Serv. Bull. 144,  
1927.
- \* Kay, Kingsley.  
Analytical methods used in air  
pollution study. Indust. & Engin.  
Chem. 44: 1383-1388, 1952.
- \* Kleinschmidt, R. V.; and  
Anthony, A. W.  
Pease-Anthony cyclonic spray  
scrubbers. Proc. U.S. Tech. Conf.  
on Air Pollution, 1952. p. 310-317.
- \* Lemon, H. M.  
Method for collection of  
bacteria from air and textiles.  
Proc. Soc. Exper. Biol. Med.  
54: 298-301, 1943.
- \* Los Angeles County. Pollution  
Control District.  
Technical and administrative  
report on air pollution in Los  
Angeles County. Annual Report,  
1949-1950. Los Angeles, 1950.  
49p.

# IX. Washing Methods.

- \* Los Angeles County. Air Pollution Control District. Engineering and Research Divisions.  
Test procedures and methods in air pollution control.  
Los Angeles County, n.d. 60p.
- \* Luckiesh, M.; Holladay, L. L.; and Taylor, A. H.  
Sampling air for bacterial content; new mechanical designs and applications of electrostatic fields. General Elec. Rev. 49(3): 8-17, 1946.
- \* Luckiesh, M.; Taylor, A. H.; and Knowles, Thomas.  
Sampling devices for determining the bacterial content of air. Rev. Sci. Instr. 20: 73-77, 1949.
- \* McConnell, W. J.; and Thomas, B. G. H.  
Relative values of methods of enumerating bacteria in air. Pub. Health Repts. 40: 2167-2178, 1925.
- \* Mac Donald, K.  
The efficiency of the Wells air centrifuge as determined by an air-washing technique. Amer. J. Hyg. 31B: 85-87, 1940.
- Magill, P. L.  
Determination procedures. Amer. Indust. Hyg. Assoc. Quart. 11: 55-63, 1950.  
Chem. Abstr. 45: 2612f.
- \* Magill, P. L.  
Sampling procedures and measuring equipment. Manufacturing Chemists Association Air Pollution Abatement Manual, 1952. Chap. 6. 39p.
- \* Magill, P. L.; Rolston, Myra; MacLeod, J. A.; and Cadle, R. D.  
Sampling certain atmospheric contaminants by small scale venturi scrubber. Anal. Chem. 22: 1174-1177, 1950.
- Meyer, A. L. A.  
A method for determining the finer dust particles in air. J. Indust. Hyg. & Toxicol. 3: 51-56, 1921.
- \* Moulton, S.; Fick, T. T.; and Lemon, H. M.  
Apparatus for determination of bacterial content of air. Science. 97: 51-52, 1943.
- Palmer, G. T.  
A new sampling apparatus for the determination of aerial dusts. Amer. J. Pub. Health. 6: 54-55, 1916.  
Chem. Abstr. 10: 1067.
- Palmer, G. T.; Coleman, L. V.; and Ward, H. C.  
A study of the methods for determining air dustiness. Amer. J. Pub. Health. 6: 1049-1075, 1916.  
Chem. Abstr. 11: 1228.
- \* Ranz, W. E.; and Wong, J. B.  
Impaction of dust and smoke particles on surface and body collectors. Indust. Engin. Chem. 44: 1371-1381, 1952.
- \* Rettger, L. F.  
A new and improved method of enumerating air bacteria. J. Med. Res. 22: 461-468, 1910.
- Roche, Louis.  
Measurement of dust concentration in the atmosphere. Rev. Ind. Minerale. No. 509: 205-210, 1946.  
Chem. Abstr. 41: 2943b.
- Ruehle, G. L. A.  
Methods of bacterial analysis of air. J. Agric. Res. 4: 43-68, 1915.
- Smyth, H. G.; and Izard, M.  
Practical hygienic efficiency of the Palmer apparatus for determining dust in air. J. Indust. Hyg. & Toxicol. 3: 159-167, 1921.  
Chem. Abstr. 15: 3888.

## IX. Washing Methods.

- \* Wheeler, S. M.; Foley, G. H.; and Jones, T. D.  
Bubbler pump method for quantitative estimations of bacteria. *Science*. 94: 445-446, 1941.

- \* Winslow, C. E. A. et al.  
Report of the committee on standard methods for the examination of the air. *Amer. J. Pub. Health*. 10: 450-454, 1920.

Winslow, C. E. A.; and Jordan, Robert.

The comparative efficiency of the circular konimeter and the Palmer water spray apparatus for the determination of the dust content of the air. *J. Indust. Hyg. & Toxicol.* 4: 375-379, 1923.

## BIBLIOGRAPHY ON

### METHODS OF SAMPLING AIRBORNE PARTICLES.

## X. MISCELLANEOUS.

- \* Aitken, John.

On the number of dust particles in the air of certain places in Great Britain and on the continent with remarks on the relation between the amount of dust and meteorological phenomena. In: *Collected scientific papers of John Aitken*, C. G. Knott, ed. p. 297-434.

Amelung, W.; and Landsberg, H.  
Particle counting in free air and room air. *Bioklimatische Beiblätter der Meteorologischen Zeitschr.* 1: 49-53, 1934.

- \* Armitage, P.

An overlap problem arising in particle counting. *Biometrika*. 36: 257-266, 1949.

Baskerville, C.

Apparatus for taking dust and bacteria samples of air. *J. Indust. & Engin. Chem.* 6: 238-239, 1914. *Chem. Abstr.* 8: 1524.

Bloomfield, J. J.

Dust in industry. The sampling and analysis of industrial dusts. *Mech. Engin.* 55: 229-233, 1933. *Chem. Abstr.* 27: 27407.

- \* Bourdillon, R. B. et al.

Studies in air hygiene. Part II. Methods of sampling air for bacteria. *Great Britain Medical Res. Council Spec. Rept. Ser. No. 262*, 1948. p. 12-53.

Brun, E.; Damon, D.; and Vasseur, M.  
Mechanical capturing of particles in suspension in air. *La Recherche Aeronautique, Paris*. 1: 15-19, 1948.

Buchbinder, L.; Soloway, M.; and Solotorovsky, M.

Comparative quantitative studies of bacteria in air of enclosed places. *Heating-Piping*. 17: 389-397, 1945.

X. Miscellaneous.

Chatterjee, G.

A note on apparatus for catching spores from the upper air. Indian J. Sci. 1: 306-308, 1936.

Ciubra, K.

Investigation on the selection of culture media for the quantitative determination of micro-organisms in the air. Med. Dosw. Mikrob. 3: 158-172, 1951.

Cralley, L. V.

Sampling and analysis of air pollutants. Proc. Air Pollution Smoke Prevention Assoc. Amer., 1950. p. 107-115.

\* Dalla Valle, J. M.

Micromeritics, the technology of fine particles. 2d ed. New York, Pitman, 1948.

Davies, C. N.

Dust sampling and lung disease. Brit. J. Indust. Med. 9: 120-126, 1952. Bull. Hyg. 27: 938, 1952.

Davies, C. N.

The separation of air-borne dust and particles. Ahiv sa Higijinu Rada. 1: 393-426, 1950. (In English).

Dmitriev, N. Z.

New apparatus for determining pollution of the air. Gigiena i sanitaria, USSR. 4(7): 36-39, 1939.

Donoso, J. J.

An improved automatic smoke sampler. J. Metals. 188(3): Trans. 610-612, 1950.

Durham, O. C.

Methods in aerobiology. J. Aviation Med. 12: 153-162, 1941.

Dust sampling apparatus.

Engineering. 166(7): 8-9, 1948.

Duval, René.

Note on sampling. Ann. Mines. 138(2): 3-51, 1949.

\* Eisenbud, Merrill; and Harris, W. B.

Meteorological techniques in air pollution surveys. Arch. Indust. Hyg. & Occupa. Med. 3: 90-97, 1951.

Erenburg, G. S.; Krasnogorskaya, M.N.;

Livshits, I. I.; and Lykhina, E. T.

Gravimetric and counting methods for determination of industrial dust contamination. Gigiena i Sanit. No. 7: 3-5, 1950.

\* First, M. W.; and Drinker, Philip.

Concentrations of particulates found in air. Arch. Indust. Hyg. Occupa. Med. 5: 387-388, 1952.

Fuks, N. A.

Advances and practical achievements in the field of aerosols. Uspekhi Khim. 19: 175-201, 1950.

\* Goldman, F. H.; Coleman, A. L.;

Elkins, H. B.; Schrenk, H. H.; and Smucker, C. A.

Report of subcommittee on chemical methods in air analysis. Sampling and sampling devices. Amer. Pub. Health Assoc. Yearbook. p. 92-97, 1939-1940.

Greco, J. B.

Aerobiology; variations of concentration of aerial pollen in three zones of Belo Horizonte. Hospital, Rio. 34: 763-766, 1948.

Grundmann, W.

Methods and apparatus for determining the admixtures of dust in air. Glas u. App. 20: 83-84, 93-94, 104-105, 125-127, 1939. Chem. Abstr. 33: 76952.

X. Miscellaneous.

- Gurevich, V. G.; and Kogan, I. B.  
Sampling of air for the chemical determinations of aero-dispersoids. Zavodskaya Lab. 10: 153-154, 1941. Chem. Abstr. 35: 5061<sup>c</sup>.
- Guthmann, Kurt.  
Industrial ejection of dust. Staub. p. 11-29, Mar. 15, 1951.
- \* Hauduroy, Paul.  
The "separator of germs". Experientia. 7: 193-194, 1951.
- Hemeon, W. C. L.  
Instruments for air pollution measurement. Meteorol. Monographs. No. 4: 20-23, 1951.
- \* Hemeon, W. C. L.; and Hatch, T. F.  
Atmospheric pollution. Indust. Engin. Chem. 39: 568-571, 1947.
- \* Herdan, G.  
Small particle statistics. An account of statistical methods for the investigation of finely divided materials, with a guide to the experimental design of particle size determinations by M. L. Smith. Amsterdam, Elsevier Pub. Co., 1953.
- Ilshöfer, Hermann; and  
Giese, H. J.  
Street air analysis in Munich. Arch. f. Hyg. 113: 195-222, 1934-35.
- \* Irwin, J. O.; Armitage, P.; and  
Davies, C. N.  
Overlapping of dust particles on a sampling plate. Nature. 163: 809, 1949.
- Ives, J. E.  
Atmospheric pollution of American cities for the years 1931-1933. U.S. Pub. Health Serv. Bull. 224, 1936. 75p.
- Kachor, L. F.  
Construction of aspirators for dust and gas sampling in air. Gigena i Sanit. No. 4: 48-51, 1950.
- Katz, M.  
The greater Detroit-Windsor air pollution study. Part II. Investigation of environmental contaminants by continuous observations and area sampling. Amer. Indust. Hyg. Assoc. Quart. 13: 206-210, 1952.
- Kluyver, A. J.; and Visser, J.  
The determination of microorganisms in air. Antonie van Leeuwenhoek J. 16: 299-310, 1950.
- Knowles, E. R.  
Dust determination in air and gases. J. Amer. Soc. Heat. Vent. Eng. 25: 67-78, 1919.
- Lapple, C. E.  
Mist and dust collection. Heating-Piping. 16: 578-581, 635-640, 1944.
- Laschinger, E. J.  
New apparatus for sampling air for dust. J. Chem. Met. Soc. South Africa. 12: 443-447, 1912. Chem. Abstr. 6: 2342.
- Laschinger, E. J.  
New apparatus for sampling air for dust. J. Chem. Met. Soc. South Africa. 13: 40-42, 1913. Chem. Abstr. 7: 562.
- Lemon, H. M.; and Wise, Henry.  
A flowmeter for use in air sampling procedures. Science. 99: 43-44, 1944.
- \* Lemon, M. H.; and Wise, Henry.  
Flowmeter for use in air sampling procedures. Science. 100: 100-101, 1944.

X. Miscellaneous.

\* Loh, L. T. et al.

Remote opening and sealing of metal tubes for taking high altitude atmospheric samples. Rev. Sci. Instr. 23: 339-341, 1952.

\* McCabe, L. C.

Methods for collection and analysis of ten classes of pollutants. Indust. Engin. Chem. 44(9): 125A-126A, 128A, 1952.

McCabe, L. C.

Two-year study on air contaminants and techniques for micro-sampling. Indust. Engin. Chem. 42(11): 115A-116A, 1950.

Maddox, R. L.

On the apparatus for collecting atmospheric particles. Month. Microscop. J. 3: 286-290, 1870.

Migunov, P. M.

Universal aspirator for selection of air samples. Zavodskaya Lab. 16: 114-117, 1950.

Moskalev, P.; and Yakuba, E.

Comparison of different methods for taking air samples in bottles. Lab. Prakt., USSR. 16: 24-25, 1941. Chem. Abstr. 35: 68914.

Mullen, F. W.

Rapid volume and concentration calculations in industrial air analysis; slide rule technique. Anal. Chem. 24: 417-418, 1952.

National Research Council.

Committee on Apparatus in Aerobiology.

Techniques for appraising airborne populations of microorganisms, pollen and insects. Phytopathology. 31: 201-225, 1941.

Owings, C. W.; Selvig, W. A.; and Greenwald, H. P.

Methods of sampling and analyzing coal mine dusts for incombustible content. U.S. Bur. Mines Informa. Circ. No. 7113, 1940. 12p.

\* Pady, S. M.; and Kelly, C. D.

Use of silicones in aerobiology. Science. 110: 187, 1939.

Pitulanka, J.

Use of airplane for microbiologic examination of upper reaches of atmosphere. Med. Doswiadcz. i Spol. 23: 104-107, 1938.

Polezhaev, N. G.; Firina, V. V.; and Laktionova, T. E.

Micromethod of determination of injurious substances in the atmosphere. Gig. i Sanit. No. 8: 15-20, 1951.

Potter, N. M.

Sampling of mine dusts. Colliery Engin. 21: 85-87; 107-110, 1944.

\* Richardson, H.

Slide rule solves gas-flow and dust-sampling problems. Chem. Engin. 55(7): 124-125, 1948.

Rikhter, E. V.

An ejection type apparatus for sampling atmospheric air. Gig. i Sanit. No. 5: 15-18, 1951. Chem. Abstr. 45: 9925h.

Rikhter, E. V.

Ejectors for sampling air and for determination of dust and gases. Gig. i Sanit. No. 9: 30-34, 1944. Chem. Abstr. 42: 4003c.

Roubal, L.; Zdrasil, J.; and Pokorny, F.

Atmosphere in industrial installations; method of sampling of the atmosphere and of exhaled air. Pracovni Lekarstvi. 2: 82-86, 1950.

X. Miscellaneous.

- Ruf, H. W.; and Fluck, W. Z.  
A portable self-powered suction apparatus for collecting air samples. Wisconsin State Board Health Bull. 6(8): 19-21, 1937.
- \* Schnetter, R.; Dunn, J. E.; and Caminita, Barbara H.  
Studies in connection with the selection of a satisfactory culture medium for bacterial air sampling. Pub. Health Repts. 60: 789-806, 1945.
- Setterling, A. N.  
An automatically controlled suction device for field air sampling. What's New in Indust. Hyg. 4: 12-17, 1947.
- \* Setterling, A. N.  
An automatically controlled suction device for field air sampling. Amer. J. Pub. Health. 34: 863-870, 1944.
- Silverman, Leslie.  
Flowmeter for use in air sampling procedures. Science. 100: 100-101, 1944.
- Smyth, H. G.  
A critical review of methods for the study of dust content of air. J. Indust. Hyg. 1: 140-149, 1919-1920.
- Stead, F. M.; and Taylor, G. J.  
Calibration of field equipment from air vapor mixtures in a five gallon bottle. J. Indust. Hyg. & Toxicol. 29: 408-412, 1947.
- Stenburg, R. L.; and Hall, L. B.  
A continuous recording particle sampler. Proc. Northeastern Weed Control Conference. p. 1-7, 1950.
- Stratton, R. C. et al.  
Dust counting and air sampling apparatus for field surveys. Heat. & Vent. 30(8): 36-38, 1933.
- Symon, K.; and Binek, B.  
New apparatus for microbiologic atmospheric examination. Lekarske Listy. 6: 51-54, 1951.
- Thelen, E.; and Muchnick, S. N.  
Freeze-out apparatus for the collection of air contaminants. J. Franklin Inst. 253: 505-506, 1952.
- Toro, R. A.  
Aerobiologic study in neighborhood of Santiago, Dominican Republic. Bol. Asoc. Méd. Santiago. 7: 1-7, 1949.
- U.S. Atomic Energy Commission.  
Handbook on aerosols. Washington, GPO, 1950. 147p.
- U.S. Pub. Health Service.  
Infrequently used dust sampling equipment. Indust. Hyg. News Letter. 7:8, 1947.
- U.S. Technical Conference on Air Pollution.  
Air pollution, proceedings. New York, McGraw-Hill, 1952. 847p.
- Van Overeem, M. A.  
A sampling apparatus for aeroplankton. Proc. Akad. van Wetenschappen te Amsterdam. 39: 981-990, 1936.
- Vasseur, M.  
Collection of suspended particles by a body of revolution in an air stream method for a sphere. Rech. Aéro., Paris. May-June: 61-64, 1949.
- Visser, J.  
Determination of bacterial content of the air with observations on air sterilization. Nedrl. Tsch. Geneesk. 94: 3514-3515, 1950.



X. Miscellaneous.

Wells, W. F. et al.

Report of subcommittee on  
bacteriological procedures in air  
analysis. Quantitating Gordon's  
bacterial test for estimating  
pollution of air. Amer. Pub.  
Health Assoc. Year Book, p. 129-  
134, 1940-1941.

White, W. C.

Quantitative bacteriologic  
analysis of air in crowded rooms.  
Texas Rept. Biol. & Med.  
3: 288-301, 1945.

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